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IN ITS 76th YEAR

October 3 1959

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NOTES of the WEEK

Stockpile Sensation

IT looks as though the first frightened reactions from Malaya and Singapore at news of the UK and US decisions to release rubber from the stockpiles are fading out. Realization is growing that, although the Board of Trade and the US releases have been described as a 'shot in the arm' for producers of synthetic rubbers, the stockpile releases will, in the long run, be beneficial to natural growers. We report elsewhere the statement by Mr R. O. Jenkins, chairman, at the annual general meeting of Prang Besar Rubber Estate. In the course of a concise and masterly survey of the outlook for natural rubber, Mr Jenkins said: 'A spectre has long loomed over commodity markets in the shape of the United States' strategic stocks—they include, it is believed, about 1,250,000 tons of natural rubber. To them must be added the 100,000 tons in the Board of Trade stockpile. Producers of natural rubber have no control over the rubber market; the prices realized come by way of impersonal market movements.'

Price Reaction

MR Jenkins stressed that 'A continuing very high price for natural compared with prices of synthetic would not be in the long-term interest of the producer,' and he went on to say, 'It is good news therefore that the American and British stockpile authorities have decided upon a policy under which their accumulations of natural rubber may be run down by stages. With a view to avoiding disruption of the markets the Board of Trade intends to disperse shortly its stock and the United States proposes to release some 470,000 tons over a period of nine years. A disposal rate of this order may not be of sufficient magnitude to cause the supply of natural to exceed the demand, but it may be expected at least to give pause to the recent steady creep up in the price of natural.' The emphasis laid by both the Board of Trade and the US General Service Administration on disposal plans which will not affect the market, and the fact that consultations were held with the principal growing countries, underlines the truth of Mr Jenkins' remarks. It also seems reasonable to assume that disposals will be so organized as to guard against any great losses being sustained by the releasing authorities. All in all, early reactions were something of a storm in a teacup.

Numerically Yours

LATEST estimate of the number of cars in use this year on the roads of the USA is 54,570,000. Like all such formidable figures (we use the term in the purely numerical sense) it is, for the majority and to all intents and purposes, inconceivable. One can, of course, do all sorts of things with figures and therein must lie a great deal of their undoubted fascination; especially to those on whom they exert anyway an almost hypnotic influence. Frankly, a million can barely be comprehended. Very few people—even take-over experts—have seen a million of anything. The situation becomes worse as one enters the utterly meaningless realm of the multi-millions. It is perhaps for this reason that so many large figures, such as aircraft passenger/ton/miles are compared to the earth's girth or multiples of it. Thuswise it can be shown that the fabulous number of cars on America's roads would, at a conservative estimate and if placed bumper to bumper, stretch at least six times round the world. Those who are fluent with figures could presumably produce at short notice an approximation of the distance which would be covered by lining up all the tyres on all those cars and even, to go more than a step further, how far these would reach if they were all straightened out and laid flat.

Big Figures

SOMEONE who can count estimated last week that, during the Election period, the Post Office will deal with 100,000,000 additional letters. This is rather more than the usual post received in this office even though at times it may not seem so. It is, in all conscience, a very handsome number but it dwindles into relative insignificance besides the total number of letters dealt with each year by the Post Office. This, an unchecked figure, is given as 9,800,000,000. In turn, this is quite small if compared with the insect population of the world or the number of inches (or square inches) in a parsec. It is thoughts such as these that give the uninitiated such confidence in mathematicians, statisticians and others who twist colossal figures round their fingers with such dexterous ease. Large figures may not, indeed, mean a thing to many of us but they look wonderful.

NEWS *Briefs*

LIBERIAN PROJECT — JAPANESE RUBBER — US POLYTHENE EXPANSION — BRAZILIAN IMPORTS GENERAL TIRE EARNINGS — SAIGON FACTORY

●**Japan**—World demand for natural rubber would continue to increase considerably over the coming years and the decision of the United States and Britain to release portions of their rubber stockpiles need not cause Singapore and Malayan rubber traders too much anxiety, Mr K. Hashimoto, chief of the rubber department of the Kasho Co. Ltd. of Tokyo, said last week in Singapore. Mr Hashimoto, who is on a visit to Singapore, said Japan would consume 165,000 tons of natural rubber in 1960.

●**Saigon**—The French rubber firm, Société Michelin, plans to set up a plant in Saigon capable of producing 4,000 bicycle tubes and tyres daily, according to the Vietnam Press agency. Plans for the factory, which will work on a proposed capital of 250 million French francs, have been submitted to the South Vietnam Government for approval.

●**Liberia** — The management of NV Rubber Cultuur Mij. 'Amsterdam' have announced that they will shortly start as a joint venture with a foreign enterprise, the cultivation of rubber in Liberia. The concession has already been promised by the Liberian Government. The project in which the Dutch company will acquire a controlling interest will be entirely financed from the company's own resources.

●**Brazil**—Following the decision of the Customs Policy Council of Brazil, to increase the imports quota of duty-free rubber from 36,000 to 52,000 tons, the Banco do Brasil's Exchange Department has set aside the equivalent of $12 million to cover the cost of the additional quota and keep the domestic market supplied up to the end of this year.

●**France**—Export licences will no longer be required for exports of natural rubber, according to an announcement in the Journal Officiel.

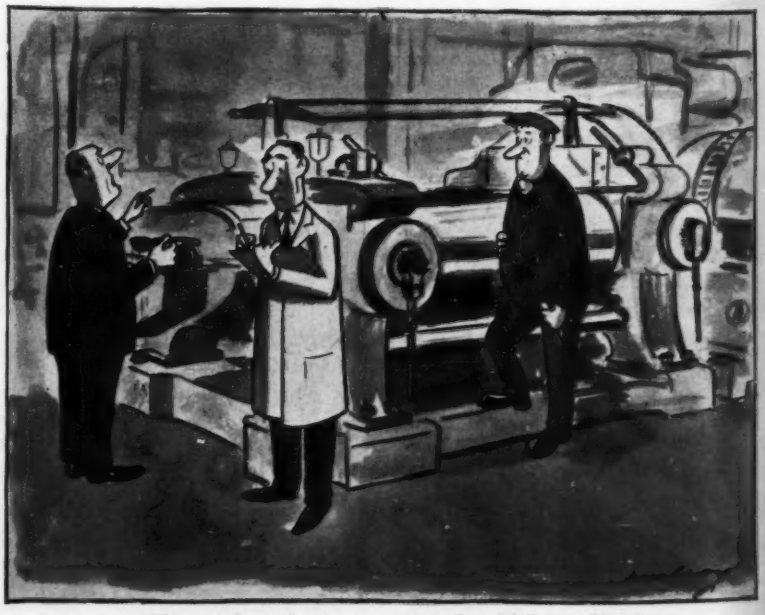
●**United Kingdom** — An agreement has been signed in Warsaw between I.C.I. Ltd. and the Polish foreign trade enterprises, Polimex and Textil-import. The agreement covers the purchase by Polimex of production know-how and a licence to enable a plant for polyester fibre to be built in Poland, and the purchase by Textil-import of polyester fibre which I.C.I. will supply to Poland during the years 1960-64. It is foreseen that the plant producing the Polish polyester fibre, under the name of 'Elana,' will be started up in 1963.

●**United States.**—The Union Carbide Corporation has announced plans for additional expansion of its high pressure polythene production facilities. New units will be added at both its Seadrift and Texas City plants which, when completed, will add 170m lb. a year to productive capacity for high pressure polythene, the company said. Construction of the new units will start at once, with completion scheduled for 1961.

●**Indonesia.**—The Indonesian First Minister, Dr Djuanda, has announced in Djakarta that nationalization was the main objective of the Government when it took over Dutch estates in the country, the Antara news agency reports. He was installing Mr Sudarmangandasubrata, of the Department of Justice, as new chairman of the Committee fixing the compensation to be paid by the Government for the nationalized estates, although no compensation claim had so far been filed by the former owners. Indonesia has agreed to pay compensation for nationalized Dutch estates on the basis of international law.

●**United States**—The General Tire and Rubber Co. increased sales by 50% over the 1958 rate to a total of 483,644,239 dollars in the nine months ended August 31. Net earnings for the same period amounted to 20,320,567 dollars or 3.79 a share on the common stock, comparing with 5,331,368 dollars or 91 cents a share in the corresponding 1958 period. The firm's tyre division continued to be the major contributor to company profits, according to Mr William O'Neil, President, while the rocketry subsidiary, Aerojet-General, continued its growth with a sales increase of 72% and a profit increase of 63% in the nine months.

●**Sweden**—Skanska Attikfabriken AB of Perstorp have recently begun full-scale production of the Vinamul and Vinalak ranges of synthetic resin emulsions and solutions. Skanska Attikfabriken AB are associated in this venture with Vinyl Products Ltd. of Carshalton, Surrey and it is hoped to satisfy the large Swedish demand for this type of product which has hitherto been met by imported materials.



'Mill number nineteen — water, brackish . . .'—452

Inventions of the First Rubber Articles

DEVELOPMENTS FROM EARLY TECHNOLOGY

By H. SCHURER, Ph.D., F.I.A.

THE birth of rubber technology in 18th century Europe was the result of the contact of European scientists with the primitive rubber industry of the Amazon region. This was entirely devoted to the production of hollow goods, and it is not surprising that the first attempts at developing rubber articles in Europe were dependent on the technique the pioneer investigators had studied in America. Thus, rubber tubing was the first application of the substance to be successfully achieved in Europe.

This invention, while obviously influenced by indigenous American rubber technology, was the result of considerable scientific effort. Once it had been made, it created considerable stir, put rubber on the map, and the continuous search for improved types of tubing and new processes constituted the main aspect of the development of the knowledge of the new substance in Europe.

Thus, the path was cleared for a far wider range of applications. As many documents illustrating the first part of the story have only come to light in recent years, this earliest phase will be treated in some detail.

Vaucanson's Enquiry

In 1762, Vaucanson, one of the greatest mechanical geniuses of his time, famous for designing automata sensational to his contemporaries, and well known for his brilliant direction of the State-owned French silk manufactures, became interested in an elastic resin called *caoutchouc* discovered on French colonial soil in America by a colonial civil servant called Fresneau. *Caoutchouc* had been discussed in the transactions of the French Academy of Science in 1751 and Fresneau's discovery had been judged of sufficient importance to be presented to the Academy by the prominent scientist La Condamine.

Fresneau had emphasized that *caoutchouc* had marvellous potentialities and should be used in European manufacture. Not a word had been published on the subject since the joint *mémoire* of Fresneau and La Condamine had appeared in print in 1755. The question was, had any further investigations confirmed or denied Fresneau's sanguine forecasts?

While we do not know for certain what particular use Vaucanson had in mind for the elastic resin of French Guiana, there is no doubt that it was his enquiry that set the ball rolling. Vaucanson's *démarche* of 1762 marks the very beginning of 200 years of rubber research. The creation of rubber tubing was its first result in the field of applications.

Fresneau—the Only Rubber Expert

Vaucanson approached his chief, Bertin, the minister in charge of industry and commerce, who in his turn contacted La Condamine, the lecturer of 1751. The academician had to admit he had nothing to add to what he had said in 1751, but was glad to inform the minister that the discoverer of rubber in French Guiana, Fresneau, was living in retirement in the provinces and had continued to interest himself in *caoutchouc*.

If there was a man capable to supply information additional to that presented in 1751 it was Fresneau. He was the one and only expert on the subject in the world. In December 1762 Fresneau received a letter from the minister asking him to draw up a detailed statement concerning any new facts on rubber he had discovered since 1751. This document initiates the creation of the modern rubber industry as we know it today.[1]

A Substitute for Latex

Before discussing the subject of tubing, the basic conceptions that had guided Fresneau's experiments and which were to guide many later investigators, must be outlined. Fresneau regarded the native rubber technology of the Amazon region, producing hollow rubber goods by application of latex coatings to a mould, as the one to follow. Latex could not be imported to Europe without suffering complete decomposition, but rubber in the form of bottles could. The problem before Fresneau and the people to follow him was to create hollow rubber goods by the same basic process of the application of latex to a mould, the place of natural latex to be taken by a man-made latex made from these rubber bottles. The search narrowed down to the search for a solvent which would dissolve rubber and then evaporate leaving a solid elastic rubber article on the mould.

The tragedy of Fresneau was that he did not find a solvent that would satisfy these conditions. His search for a man-made latex proved to be in vain. In the statement Fresneau submitted to the minister at the beginning of 1763, he had to admit that he had completely failed in the aim he had set himself. His statement was permeated by the atmosphere of basic defeat. He was not in a position to suggest an efficient solvent process for the manufacture of hollow rubber goods. That brings us back to the subject of tubing. This had been the application around which the researches of Fresneau had been made to centre.

Tubing Made Without Solvent

It had been the suitability of rubber for tubing that had been at the back of Vaucanson's mind when starting his inquiry, this at least was the suggestion La Condamine made to Fresneau at the beginning of 1763. As Fresneau had not solved his basic problem of the solvent process he was unable to present a method for making tubing by the application of man-made latex to a mould. He himself and everybody else who saw the statement at the time regarded this as his great failure. Only now, when studying this remarkable document in the light of 200 years of rubber research, can one see that Fresnau had come quite near to an alternative solution of his problem of reducing rubber to a workable shape and of constructing tubing.

Fresneau was the first man ever to make the all important observation that freshly cut pieces of rubber have a strong power of mutual adhesion. Only since the publication of his forgotten *mémoire* of 1763 in 1942 have we been in a position to appreciate this contribution, and hitherto no attention seems to have been drawn to it. If the solvent process was beyond his reach, a solventless method might as well be described, or so he

thought, however much it appeared to Fresneau as a poor second best.

The Mutual Adhesion Process

As was only natural, under the circumstances, Fresneau used his discovery to build up tubing—the first rubber article ever made in Europe, which, however, was to remain unknown for almost 200 years. Using a clay former he stuck many small pieces of freshly cut rubber together by pressure with the fingers until a tube was formed. Then the clay mould was removed by water and the solid rubber tube remained. When cutting it with scissors, Fresneau used the same observation to weld the two cut halves together again, applying pressure. Again and again, Fresneau emphasized that any damage in rubber tubing could be mended by the utilization of the natural adhesion principle.

Often, Fresneau's discovery of the natural adhesion has been ascribed to Thomas Hancock; in reality it was made several times in the 18th century, which does not diminish the brilliant use Hancock made of it for the construction of the masticator. Hancock's special application of the general principle in the construction of tubing will be discussed below. As it was, Fresneau's pioneer discovery of the adhesion process was completely overshadowed by his failure with the solvent process. In addition, he overestimated the importance of simultaneous heat treatment for the adhesion method.

Rubber Tubing for Water Supply

He got so carried away by the perspectives of soldering and welding rubber, after heat softening had been achieved, that his proposals must have struck people as impracticable. He suggested heat-softened rubber to be used for joining metal pipes for water conduits. He proposed tubing of 6–8ft. length to be made of rubber in America, and these lengths to be joined by heat treatment of the adjoining parts. All this diverted attention from his fruitful discovery of the adhesion of freshly cut units of rubber for each other, which he did not formulate clearly, but which is unmistakably implied in many passages of his statement. Fanciful proposals for building up water conduits made of rubber hose imported from America and welded together in Europe unfortunately confused the issue.

Bertin's Approach to Macquer and Hérissant

Fresneau's *mémoire* of 1763 made it quite clear to Bertin that the only man alive who had been giving any attention to the rubber problem since 1751 had dismally failed in his avowed object of finding a solvent process for creating solid rubber articles. Nobody could have blamed Bertin if he had dropped the subject completely. Surprisingly enough, he decided to go on with the enquiry. He was in a position to pick the best scientific brains in the country for the difficult task. The problem that had baffled the scientific amateur, Fresneau, working with inadequate equipment in provincial retirement might be solved by people of outstanding calibre with the best facilities available.

Bertin's choice fell on the leading French chemist, Macquer, and, less obviously, on a prominent medical man, Hérissant. It would have been absurd to keep Fresneau's statement secret from these two, and they obviously acquainted themselves with the document. Bertin put the whole project under the auspices of the Academy of Science, of which he as well as Macquer and Hérissant were fellows, and apparently suggested the end of the year 1763 as a deadline for an interim report.

Only in 1944 have the relevant documents been published from the archives of the Academy. In December 1763, on separate days, statements by Macquer and by Hérissant were deposited in the archives of the Academy and copied in the journals of the institution. All these facts remained unknown until 1944. Macquer and Hérissant had obviously both been approached by Bertin separately, had both been made acquainted with Fresneau's statement, and had then carried out their investigations quite independently from each other. They had been given the same deadline for their interim report. Both worked entirely along the lines of the solvent process as outlined by Fresneau.[2]

The Interim Report of December 1763

The salient fact that emerged from the few lines of Macquer's statement of December 1763 was that he had brilliantly succeeded where Fresneau had failed. By discovering highly rectified ether as the solvent for rubber which met all the conditions for a man-made latex Macquer had achieved in a few months what Fresneau had failed to achieve in as many years. Macquer, of course, had the advantage of profiting by Fresneau's spadework.

The second great step forward was made by Hérissant. He got away from the Utopian habit of compiling long lists of possible applications of rubber all based on the assumption that unvulcanized rubber had the properties of vulcanized rubber, and suggested a practical application for the substance which was technically feasible once the solvent process had been achieved.

In the field of surgical goods rubber met a long felt want and gave a performance superior to the same articles traditionally made of metal. It was no accident that this specific use of rubber tubes for catheters was suggested by a prominent medical man.

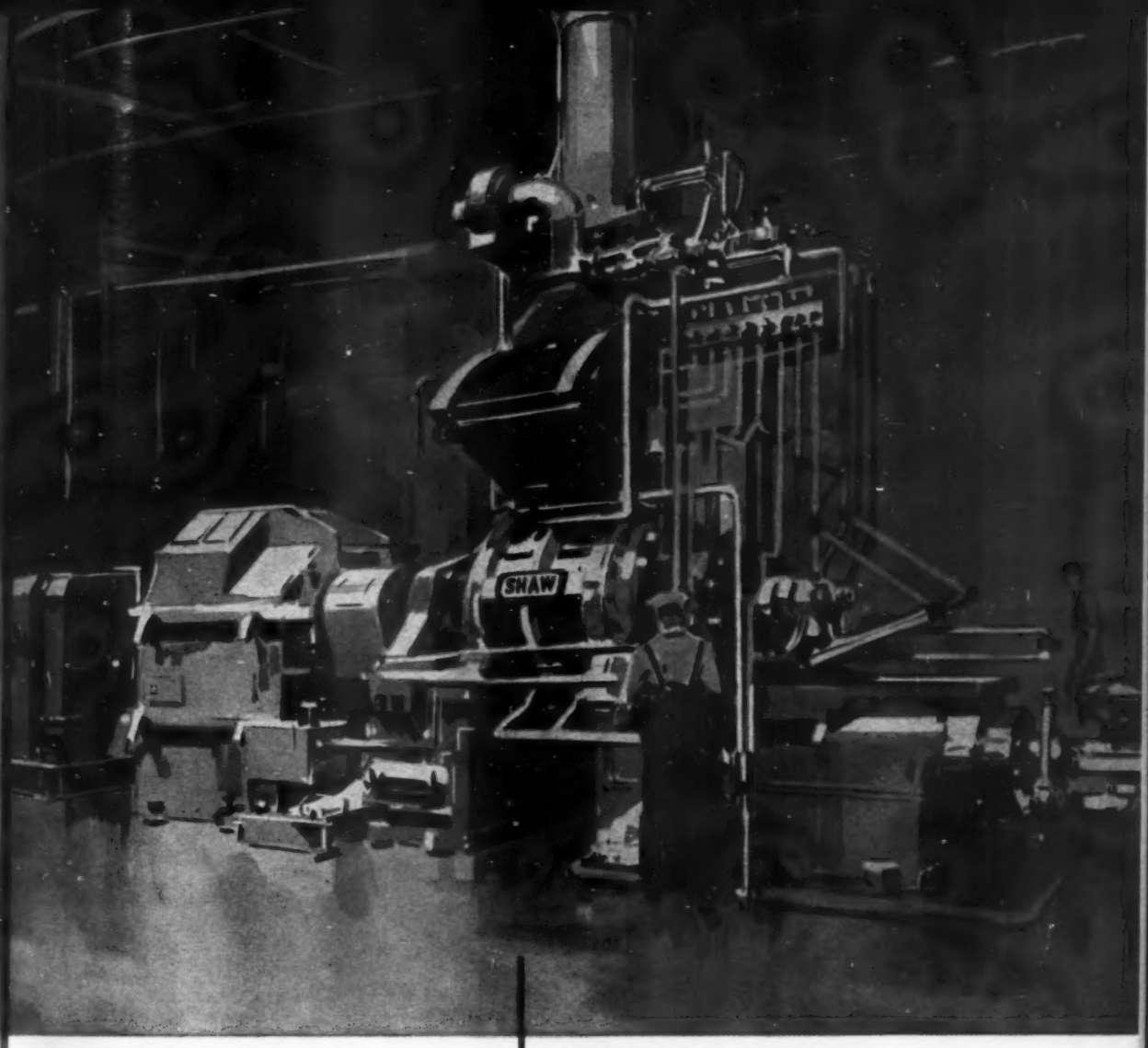
The proceedings of the Academy for 1763,[3] published in 1766, devoted one page and a half to an unsigned note summarizing Macquer's and Hérissant's discoveries. Fresneau was not mentioned at all, and for a long time the reason why suddenly two eminent men should study the same problem and report to the Academy at the same time was unknown. Since the details have been filled in, the story has become much more intelligible.

Fresneau's Paper Remains Unpublished

As Macquer had overcome the obstacles against the solvent process there appeared to be no point in publishing an account describing Fresneau's failures in wrestling with the same problem. Fresneau was ruthlessly brushed aside, and together with some of his fanciful stuff his new original contribution was dismissed into limbo. Bent as Macquer and Hérissant were on the solvent process, they failed to realize that Fresneau had made a very interesting discovery. To them, Macquer's victory rendered the publication of Fresneau's statement unnecessary. For 200 years it was unknown that the first rubber article created in Europe, a small piece of tubing constructed according to the natural adhesion method, had been due to Fresneau. The man who discovered *Hevea brasiliensis*, also discovered the principle on which the first rubber processing machine was to be built.

Macquer's Solvent Process

After making his one fruitful suggestion which was to dominate the rubber field for 60 years, Hérissant dropped out of the picture completely. Macquer, however, received strong encouragement from Bertin to carry on. Nobody took the trouble to inform Fresneau that the problem that had baffled him for many years had been solved by Macquer in 1763. Working along the lines of Fresneau's solvent process, combining his own discovery of the ether solvent with the suggestion of Hérissant's of rubber



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OVERSEAS AGENTS THROUGHOUT THE WORLD

P.2806

catheters, Macquer really put rubber on the map.

In 1768 he devoted a whole paper read to the Academy to the subject. This created a considerable stir in scientific circles.[4] That is illustrated by the fact that a very long version of his paper appeared in the leading London periodical, the *Monthly Review*.[5] Macquer was the first to demonstrate in published print that by using the means of European science for processing the rubber bottles imported from America, solid rubber articles could be made in Europe. This was a veritable triumph for 18th century chemistry.

Macquer's Tubing

Macquer's variation of Fresneau's solvent process consisted in the application of the ether solution to a wax former which was then removed by boiling water. A rubber tube was left. Owing to the softness and flexibility of the material, such rubber tubing was regarded as having great advantages over metal for use as catheters. These rubber catheters must have met a real need as almost the whole story of rubber for the decades to come centred round the production of this kind of surgical tubing. There were great snags, however, the most important being the prohibitive price, both of rubber and of the solvent.

In the same year 1770 when Macquer's sensational paper of 1768 first appeared in print in Paris, rubber cubes of about half an inch were sold in London for 3s. a piece. Macquer himself admitted that one ounce of ether cost twelve *livres*, which must have made the ether process fantastically expensive. The purchasing power of one *livre* at the time was about equivalent to that of one US dollar in 1956.

Theden's Catheters

Macquer's achievement did not remain unchallenged. He had combined two advances, the use of the ether solvent and the application of the rubber tubing thus formed for surgical goods. On both fronts criticisms arose, in each case the criticism led to new suggestions. The first attack on Macquer's surgical tubing came from a prominent medical man, the Prussian surgeon J. C. A. Theden, who gave a lecture 'on the newly invented catheters made of *resina elastica*' before the Prussian Academy of Science in Berlin in 1776. This was printed in the form of a small pamphlet in 1777 and again in a collection of Theden's essays published in 1782.[6]

Theden asserted that tubing developed according to Macquer's directions would be far too soft to overcome the pressures opposed to it when used inside the human body. It would be flattened out and thus be rendered unable to conduct liquids. Adopting Macquer's solvent process, using about 30gm. of ether to dissolve 3.6–3.9gm. of rubber, he proposed a type of reinforced tubing. Fine wire spun with silk would be spirally wound round a strong wire, afterwards the silk-covered fine wire spiral would be coated 40 to 50 times with the ether rubber solution.

Theden claimed that this reinforced tubing had given satisfactory service. He tried to reduce tackiness by using dusting agents, but gave up the attempt as the dusting agent made the rubber brittle.

Apart from this remarkable proposal, Theden was an early enthusiast for the use of rubber in medicine, but as these applications consisted in ingenious proposals of the use of the original American rubber bottle for breast relievers and of pieces of rubber for trusses, they did not advance rubber technology as such.

The Cavallo Process

Rather more serious for Macquer's reputation than the excessive softness of his rubber tubing were the repeated attacks on him concerning his use of ether as a solvent of rubber. Still, in Macquer's lifetime, at least two articles appeared roundly stating that Macquer's claim that in ether he had found the one and only substance suitable for the solvent process was unfounded, and that experiments by other investigators had not substantiated it.[7,8]

From there the story leads across the Channel to one of the first contributions to rubber technology made in England. After the death of Macquer in 1784, the young French scientist Barthelemy Faujas de St. Fond purchased his laboratory equipment and found among it one decanter wherein there was rubber perfectly dissolved in ether. The decanter was labelled, in Macquer's handwriting, 'Elastic gum dissolved in ether, sent from London.'

As it happened, Faujas de St. Fond travelled to London in the same year and there visited the Italian-born scientist Tiberio Cavallo, who was resident in England. Cavallo, by a great stroke of luck, had been the despatcher of the rubber-ether solution to Macquer. He took the opportunity of describing his method of producing purified ether as well as his variation of the solvent process of tube production to Faujas. Cavallo was the originator of the dipping process. As it is one of the earliest contributions made in England to the production of solid rubber goods, it might be described in his own words by Faujas, the narrator:

'There is first prepared a small cylinder of pipe clay of the diameter and length of the intended tube. It is not necessary to bake it, but simply to let it dry.

'The æther, saturated with gum, is poured into a case of glass or tin, which should be a little longer than the clay clinder. This is filled up to the brim.

'The operator then plunges the whole length of the clay pipe into the æther, withdraws it suddenly, lets it remain for an instant in the air, replunges it anew and repeats the operation in proportion to the intended thickness of the tube, for each immersion and evaporation produces a small coating.

'This being done, the clay cylinder covered with elastic gum is plunged into a vessel of water, the mould of clay is then speedily dissolved and the gum remains in the state of a perfect tube. . . .

'. . . It may be objected that the process with æther is too expensive. The objection holds good with respect to ordinary purposes, but the elastic gum has been so usefully employed in surgery and some other arts that there are circumstances in which expense ought to be of no consideration.'[9]

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(To be Continued)

Duty Free Catalyst

Exempted from payment of import duty until September 30 1960 is 'Dabco,' a catalyst for one-shot urethane foams. Jacobson Van Den Berg and Co. (UK) Ltd. point out that this material, previously rated at 33⅓%, will be available at a considerable price saving.

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I.C.I. Isocyanates and Polyesters can be used to make a soft, resilient material eminently suitable for printers' rollers. Hardwearing and unaffected either by humidity or temperature changes, these rollers are very durable and can be cleaned easily; their non-porous surface always retains a good tack. They can be run at the highest speeds and inking is uniformly good. Colour changes can be made quite easily, without danger of tinting.

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Dusseldorf Exhibition

PREVIEW

LATEST figure for the number of exhibitors at the Dusseldorf Plastics Exhibition (October 17-25) is 642 of whom slightly over one-third are from foreign countries.

British firms exhibiting, besides those showing on the combined display (recorded in earlier issues of *RJIP*) include B.I.P. Chemicals Ltd., Holloway Dolls Ltd., Hunt and Mitton Ltd., Imperial Chemical Industries Ltd., The London and Scandinavian Metallurgical Co. Ltd., Peco Machinery Sales Ltd., Polypenco Ltd., Shell International Chemical Co. Ltd., Wiggins Teape Ltd., and R. H. Windsor Ltd.

French manufacturers of plastics processing machines have a combined exhibit on the Syndicate (Matform)

The DSM 11/150 continuous mixer and twin screw extruder. Krauss Maffei, Munich

stand. All the chief methods of plastics processing are represented including hydraulic, mechanical, vertical and horizontal machines for injection moulding; extruders, including a new type of extrusion blowing machine; laboratory test machines, including one that can be converted simply for use as a calender, mixer, extruder and injection moulding machine. Of interest, too, will be an electronically controlled printing device for printing on objects of various shapes.

The Federation of French Plastics Products Manufacturers are also to have a collective stand in which 16 companies are taking part. Products cover a wide range from polyester reinforced doors, industrial mouldings, insulating materials, to food containers, pipes and ducting.

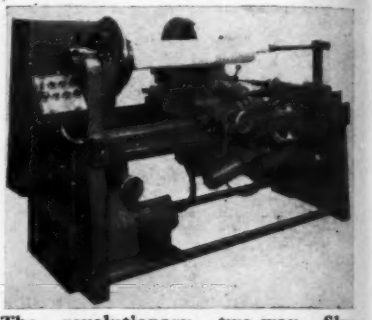
About 15 Belgian companies on the combined stand of Collectivite Belge des Matieres Plastiques will show a considerable range of plastics manufactures including films, floor coverings, tubes, piping and packing materials, clothing, industrial equipment and household items.

The Italian Association of Plastics Industries, Unionplast, is to exhibit manufactured products of five associated industries using PVC for sheeting and coated fabrics, car and furniture upholstery and wall coverings.

Among a number of machines to be shown on the stand of Krauss Maffei, Munich, is a continuous mixer, DSM 11/150 with a high granulate output. The machine is notable for the combination of a twin screw extruder with an internal mixer. The two meshing screws rotate in the same direction at speeds 65-22/44-15 rpm. Mixing is effected in an adjoining helical section designed as engaging kneading blades. A hydraulically adjustable conical gap between the kneading blade and the discharge screw section controls the time during which material remains in the kneading section of the machine. The machine is air cooled and capacity per hour (low pressure polythene) is about 880lb. (400kg.).

Erwin Kampf of Bielstein-Rheinland, makers of precision slitting and rewinding and other machines, will also be exhibiting. Among the machines on show will be a laboratory model of their new and revolutionary stretching machine for all extruded film which stretches in both directions simultaneously, granulating machines, slitting and re-reeling machines and their fully automatic lathe type slitting machine (illustrated). Agents in the UK are Engelmann and Buckham Ltd., Alton, Hampshire.

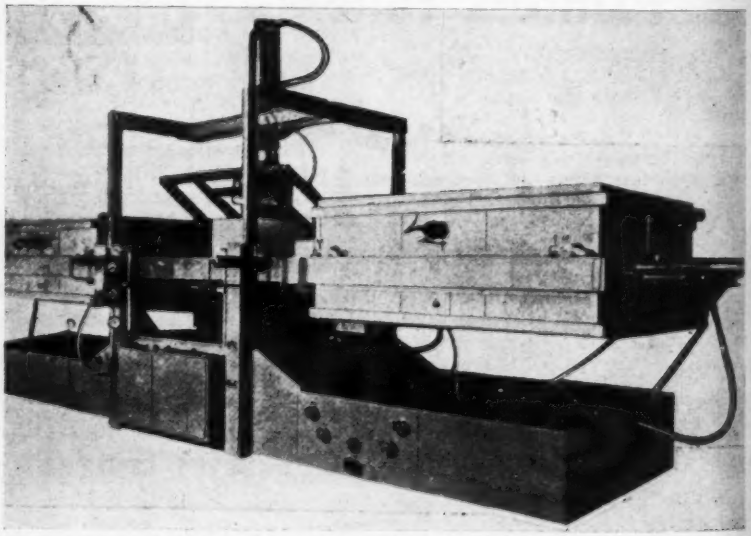
An interesting machine to be displayed on the stand of Schulte-Ultex AG is the HTF 21D machine for drawing formed parts up to 23.6in. (600mm.) in depth from thermoplastic sheet of 51.1 x 62.9in. x 0.6in. thick (1,300 x 1,600 x 15mm.). This is a fully automatic high-speed vacuum forming machine for mass production of complex shapes and double wall cabinets for refrigerators. There is infinitely variable regulation of all dwell times, temperatures and speeds. Sheets are heated in two attached heating cabinets, a method which has been shown to provide mild treatment of materials and uniform wall thickness of the finished



The revolutionary two-way film stretching machine of Erwin Kampf, Bielstein-Rheinland

part. The two heating cabinets and a double clamping frame allow for the simultaneous handling of two sheets, one being heated while the other is being drawn. The machine can be used for six different vacuum forming methods.

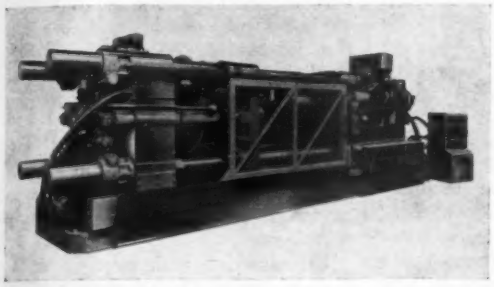
Peco Machinery Sales are to show four injection moulding machines. These range from the 12MS12, with a shot capacity of 1oz. (in polystyrene) and a plasticizing capacity from 35 to 50lb./hr. according to



The Schulte-Ultex, AG, HTF 21D fully automatic high speed vacuum forming machine

heating method. The 30MS30 has capacities of 4½ or 6oz., depending on the injection chamber fitted. Plasticizing capacity for both size shots is 90lb./hr. An in-line preplasticizer on the 30MP40 marks the main difference between this machine and the 30MS30. Plasticizing capacity is the same but shot capacity, on standard pressures, is 9oz. Pressures of up to 15,000 psi are available on these units for normal production on fully plasticized materials but this can be about doubled for thin section moulding. The fourth machine is the 60MP60, a preplasticizing machine with a 60oz. shot capacity and a plasticizing capacity of 200lb./hr.

R. H. Windsor Ltd., Leatherhead Road, Chessington, Surrey, will be showing two injection moulding machines—the W15 and the AP200. The W15 is a fast cycling 4oz. polystyrene capacity machine which is capable of plasticizing 35 to 40lb. per hour, fitted with a Strateflo material cylinder and selective plunger preadvance. The AP200, which was shown for the first time at the International Plastics Exhibition in London, will mould articles up to 124oz. in polystyrene. It is fitted with the Autoplas twin-screw, two-stage preplasticizer.



The R. H. Windsor Ltd. AP200 injection moulding machine

IRI Midland Section

The first meeting of the 1959-60 season was held by the Midland Section of the Institution of the Rubber Industry on September 18 when some 60 members and guests met at the George Hotel, Walsall.

Following an informal dinner, the chairman, Mr W. D. Bradshaw, expressed the pleasure of the company in having so many of the ladies present and then introduced the speaker, Mr Barry Edgar, the well-known BBC Midland Region Television Producer, who gave a most entertaining talk under the title 'Focus on Vision.'

'Lusin' Mould Release

Four mould release agents, well known on the Continent under the trade name 'Lusin,' are now available in England. The manufacturers, Lange and Seidel, of Nuernberg, have appointed as sole UK agents Charles H. Windschuegl Ltd., 1 Leadenhall Street, London, E.C.3. The four agents comprise Lusin KE 10, a universal mould release agent, KE 195 for glass clear mouldings and phenolic resins, KE 200 for polyesters, epoxy resins, etc., and KE 400 for the separation of reinforced plastics manufactured under conditions of heat and pressure.

Owing to expansion, Reinforced Plastic Developments, makers of 'Dolphin' shower cubicles, have moved, as from September 30, to new premises at Old Town Wharf, Swan Street, Isleworth.

Dunlopillo Appointments

Mr A. M. Harral, sales manager (retail) for Dunlopillo has been appointed the division's marketing manager. Mr Harral's duties will include the sales promotion of existing lines as well as the development of new products in the field of consumer goods.

A. M. Harral (*left*), new marketing manager for Dunlopillo. George Davenport (*right*) succeeds Mr Harral as sales manager, retail, for Dunlopillo

Mr Harral, who was educated at Oundle and has been with Dunlop since 1946, is succeeded by Mr George Davenport, Dunlopillo's area manager for the north of England for the past two years. He joined Dunlop in 1930. Both Mr Harral and Mr Davenport will be based at the new Dunlopillo headquarters at Castleton, Rochdale.

Mr J. Morton has been appointed a director of Mendaris (Sumatra) Rubber and Produce Estates Ltd.

LITTER BINS

Litter bins of new and pleasing appearance, made from reinforced plastics and designed to exploit the benefits of this material, are now being brought into use as part of the anti-litter campaign. The new bins are of two types, either free-standing, as illustrated, or post-type for fitting to lamp-posts, etc., supplied free to local authorities by Elton Civic Supplies Ltd., Aylmer Parade, London, N.2, and made from Bakelite polyester resin, reinforced with glass fibre. In bright, unfading colours, they are attractive to look at and enhance rather than detract from the normal street scene. Also, and importantly, they are less prone to abuse than most other types of bins

The Analysis of Plastics

4—APPLICATIONS OF MODERN METHODS

WHEN Dr J. Haslam, chief analyst of I.C.I. Plastics, gave the fourth lecture in the evening series on 'Analysis of Plastics' at the National College of Rubber Technology recently he began by recalling the position when he gave a series of five lectures on this subject at the College four years ago.

In 1955, said Dr Haslam, most of the work on nylons had been accomplished by chemical breakdown of the samples with hydrochloric acid and subsequent identification of the hydrolysis products, account being taken of the nature as well as the proportions. Most of this work, at that time, was supplemented by infra-red evidence. Polyvinyl chloride compositions were treated with ether to remove the plasticizer, prior to isolation of the polymer by the tetra hydrofuran procedure. Most of the work on polymethyl methacrylate and related polymers had been carried out by vacuum depolymerization supplemented by infra-red test. Dr Haslam indicated that one of the most significant changes had been the increasing tendency to make use of infra-red evidence. A great deal of the analyst's time was now taken up in effecting preliminary separation prior to the use of infra-red spectrometers as a final and unequivocal means of identification of separated substances. Here Hummel's latest book, in which a great deal of valuable information was presented about the infra-red spectra of a large number of natural and synthetic resins, was particularly useful.

Nylon

The lecturer then dealt with particular changes with which he had been associated. For example in the case of nylon type polymers, there were sometimes difficulties in assessing their infra-red spectra, and particularly so with copolymers. In his latest method of chromatographic separation, the nylon was first hydrolysed with hydrochloric acid and the products of hydrolysis separated by ring paper chromatography. The separated products could be identified by ninhydrin and methyl red borate buffer spraying, and practical examples of the test were shown. Dr Haslam drew attention to the possibilities inherent in zone melting for the isolation of small amounts of one substance in the presence of another. In connexion with polyvinyl chloride the new semi micro method for the determination of chlorine devised by Hall and himself was useful. In this, quite small amounts of polymer were fused with sodium peroxide and dried starch in a metal bomb, and the chloride in the fusion product determined by automatic titrimetry with standard silver solution. This method was contrasted with that now proposed by Schöniger and others for the determination of chlorine in organic substances by preliminary combustion in oxygen in a glass flask. The extreme accuracy required in this test was emphasised. The introduction of polymeric plasticizers such as polypropylene adipate had caused some difficulties for the analyst. These plasticizers could often be isolated in a pure condition by following the ordinary ether extraction and extraction with hot methanol.

Lead in PVC

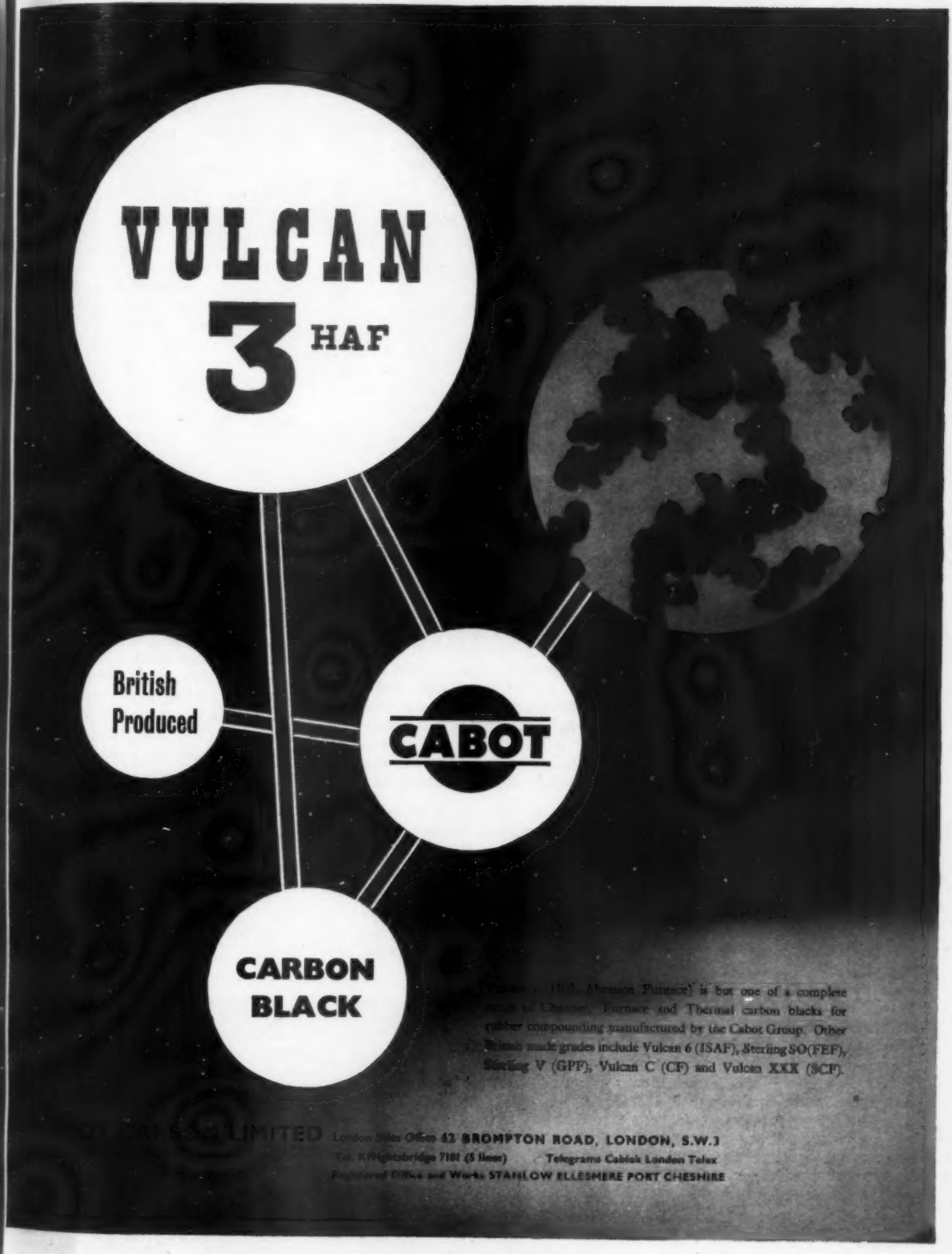
The method for the determination of lead in polyvinyl chloride compositions was described. The composition was first treated with ethylene dichloride; this released the lead compound which was then dissolved in concentrated hydrochloric acid. This acid solution was then made 50% v/v in hydrochloric acid prior to determination of the lead by taking advantage of the absorption of the lead complex at 270 millimicrons. Any slight interference of iron could be corrected for. Price's application of the principle of this test in the determination of di alkyl tin dichloride etc. in polyvinyl chloride compositions containing lead etc. was dealt with in some detail, and information was given about the determination of ionized chlorine and free stearic acid produced in the course of manufacture of certain polyvinyl chloride compositions.

In connexion with methyl methacrylate, Feigl's hydroxamic acid test was of great value in the determination of methyl methacrylate in air. In this test the methyl methacrylate after absorption in alcohol was treated with alkaline hydroxylamine solution. This produced an alkali hydroxamate, which on treatment with acid and ferric salt gave a beautiful violet colour. The vacuum depolymerization and vapour phase examination of the vacuum depolymerization products of acrylate polymers were discussed briefly. Particular attention was directed to the procedure by which the identity of a polyester film was established. After ultimate analysis of the film, ethanolamine hydrolysis resulted in the production of a crystalline phenol. The steps taken in the identification of this phenol were described, and the method by which phenolic residues were combined in the polymer was worked out. At this stage evidence was presented of the use of ASTM index in the identification of organic substances. The value of Wickbold's method for the oxy-hydrogen combustion of fluorinated products which might arise from the heating of PTFE was discussed. The lecturer described the determination of PIB in polythene, and illustrated the fundamental chemistry underlying the determination of NN' di beta naphthyl p. phenylene diamine in polythene.

In connexion with plasticizers, Dr Haslam described the method which he used with success in the isolation of alcohols derived from phthalate plasticizers, and discussed the value of Davison's method of examination of plasticizer mixtures, which involves the separation of the individual plasticizers on Celite silica gel columns. The procedure to be followed in the examination of mixtures of chlorinated paraffin wax, phthalate and tritolyl phosphate mixture was detailed. Finally the lecturer dealt with the chromatographic separation of mixtures of adipic, phthalic and sebacic acid and pointed to the usefulness in general work of two interesting papers: (1) A paper by Penketh and Harvey on the determination of ortho phenyl phenol, and (2) a paper which dealt with the UV absorption of melamine on both acid and alkaline sides.

Discussion

The lecture was followed by a discussion in which Dr Haslam said that for the analysis of Terylene, the ethanolamine boiling treatment was a good method of attack. The ethanolamine was used up in forming a derivative and the phenol remained free. With polyurethanes, hydrolysis with 50% hydrochloric acid gave tetrahydrofurane from a 1:4 butane diol component, in distinction from the products of hydrolysis of a nylon. For detection of a polymeric plasticizer after removal of all the non-polymeric plasticizer together with some of the polymeric plasticizer by ether extraction, hot methanol extraction removed a polymeric plasticizer such as polypropylene adipate in the pure state. It was readily detected in the extract by its precipitation on cooling.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EXPANDED POLYSTYRENE

DR W. B. BROWN, speaking on 'Expanded Polystyrene: The Influence of Bulk Density on Physical Properties,' at the recent International Plastics Exhibition Convention in London, delivered a paper packed with data gleaned from a mass of carefully worked out experiments, to satisfy the needs of the designers and engineers wishing to use expanded polystyrene. Among the virtues which commended expanded polystyrene to many people Dr Brown rated highly its cheapness, its low thermal conductivity and its wide range of bulk density. The immediate object of his paper was to relate variation of bulk density, from 1 to 10lb. per cu. ft., to changes in a number of physical characteristics of the material.

To ensure consistent results great efforts were made to minimize differences in the material under test. The same stock of polystyrene beads was used throughout the experiments; they were expanded and moulded under the same conditions using either steam or hot water. Test pieces were cut by means of a hot wire (apart from the 10lb./cu. ft. material which needed a fine-toothed saw) and the fused edges were removed with sand paper. Variations in the material under test were minimized by statistical randomization of the experimental samples.

Adequate consolidation of the beads in their expansion and moulding was essential if the best was to be obtained from them, and experiments had established that steaming was the preferred method of making the block.

Early slides showed that changes in bulk density had little effect on thermal conductivity. A minimum conductivity could be detected between 2 and 4 lb. per cu. ft. but this was of no great significance. A comparison of the conductivities of various materials showed that that of foamed polystyrene was lower than most and almost equivalent to still air. This last fact looked a little less impressive when an insulation specialist subsequently suggested that the thermal conductivity of still air was 'nothing to shout about.'

Strength

The flexural strength increased linearly with bulk density from 40 psi at 3lb./cu. ft. to 350 psi at 10lb. per cu. ft. Modulus in bending increased, but not proportionately, with bulk density while compression strength also increased more quickly than the corresponding density. Values given were 20 psi for the 1lb./cu. ft. foam and 300 psi for the 10lb./cu. ft. material. There is a variation depending on the rate of loading.

Tensile and impact strengths increased less rapidly than density. For example the tensile strength was 20 psi for 1lb. per cu. ft. but was only 80 psi at 10lb. These values depended very much on the degree of consolidation in moulding and it was found that strengths obtainable by steam moulding were at least twice as high as those from boiling water.

Creep, or deformation under load, was studied in great detail since this was such an important factor in the use of foamed polystyrene in packaging or as a structional member. Behaviour under sudden and continuous load was reported and response to single and repeated impact with various loads for differing periods were all given in a profusion of tables and curves. Creep occurred in all conditions though this could be characterized as initial and continuing. As density increased there was less evidence of the latter variety, but as might be expected the higher the load the greater the creep.

Discussion

In discussion one questioner suggested that the thermal conductivity of foams could be made less than that of still air by the incorporation of high molecular weight gases, *e.g.* with halogenated hydrocarbons, particularly fluorine derivatives. This was disputed however by another member of the audience who said that this was only a temporary effect since these gases of low thermal conductivity were not retained in the cells of the foam. Miss Raskin thought that this loss of gas might not provide an insuperable problem. Perhaps a skin of sorts around the foam would stop diffusion.

Another speaker elicited the information that foamed polystyrene was very suitable for low temperature applications, say at temperatures of −30°C. The discussion closed with the slightly depressing information that birds found the material very much to their liking and so discouraged farmers in this country from using it in a number of ways for which it was otherwise admirably suited. A similar report came from India. Dr Brown appeared to be well aware of the problem and was hoping that the nasty tastes that he was adding to the polystyrene would make the birds less enthusiastic.

'Natural Rubber Versus SBR'

As part of the winter programme of the London Section of the IRI, a panel discussion is to be held on 'Natural rubber *versus* SBR' at which speakers representing natural rubber, synthetic rubber and user interests will answer questions put to them by members. The discussion will take place at 7 p.m. on Tuesday December 8 at Manson House, Portland Place, W.1.

Both technical and economic questions will be welcomed and these should be sent to A. Fiber, Esq., A.I.R.I., Hon. Secretary, London Section IRI, Du Pont Co. (UK) Ltd., Elastomers Research Laboratory, Maylands Avenue, Hemel Hempstead, Herts.

Ejector pads made from Rubazote are used to facilitate ejection in the stamping out of plastic letters with these cutters, made by Art Pattern & Knife Co. Ltd., Leicester. Rubazote, a soft expanded rubber with a closed cell structure, is made by Expanded Rubber Co. Ltd., Croydon

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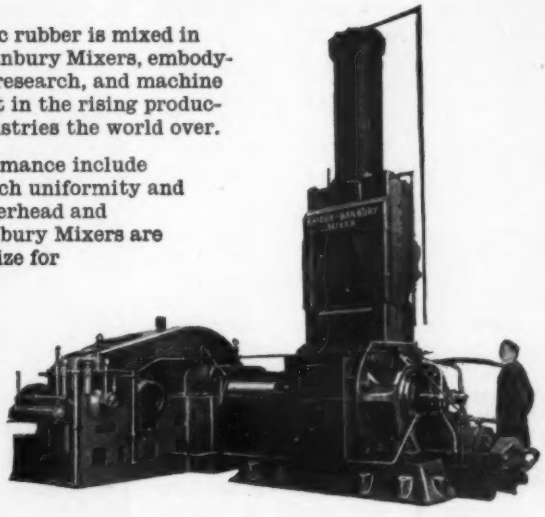

Fully detailed technical information is freely available on request.

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Rubber and Plastics in South Africa

NEWS OF FIRMS AND PRODUCTS

WHEN the Messina Transvaal Development Co. Ltd. wanted to convert a flat belt to a vee-belt they contacted the Goodyear Technical Service. The advantages of changing to vee-belts were a considerable saving in space and also a silent running drive, with the elimination of belt noise. The conversion was on an Ingersoll Rand two-stage horizontal compressor driven by a 300 hp motor which ran at 735 rpm. The 28 in. wide 10-ply flat belt which operated over 25 ft. centres was replaced by 10 Goodyear HY-T E-330 vee-belts over an 84in. diameter compressor pulley and a 25.4 in. diameter vee-pulley motor. This was a saving in space, for the resultant centres were 6 ft. apart. A total of 564 hp was transmitted.

Rigid PVC and HI Piping

Pretoria Industrial Plastics (Pty.) Ltd., Pretoria, is the first company in South Africa to undertake the production of rigid PVC and high impact PVC piping. The company reports that it has been equipped with the largest extruder in South Africa, by means of which it can produce extruded piping in all diameters up to 18 in. This piping is guaranteed resistant to the effects of chemicals or corrosion and to be superior in many other respects to the competing types of piping made locally.

Surgical Gloves

The Vulco Chemical Co. Ltd., Industria West, Johannesburg, have not been making rubber toys for some time as this form of manufacture is not profitable in South Africa under current conditions. But they have a big output of household and surgical gloves, and it has been successful in securing tenders from the Union Government and other authorities. Last year they won the complete contract for the supply of surgical gloves to the Belgian Congo. This firm has also increased its output of babies' teething teats and soothers and has been experimenting with the production of latex tubing for surgical use, and expects to put this line into production in the very near future.

'Utrilon' Footwear

Pretoria Industrial Plastics report that they have secured the South African rights for the production of Utrilon footwear. The range made in this company's Pretoria factory is reported to be so good that consignments have been exported to Great Britain, and in addition to receiving repeat orders from Britain it has also been successful in obtaining a satisfactory contract for the supply of such footwear to a big American company. Sandals made in this substance are being offered on the South African market retail at 9s. 11d. a pair. The company now has the moulds to prepare Utrilon footwear in 40 different styles, but currently production is mainly directed to sandals for the men's, women's and children's trade. They are also moulding the Wiatoki shoe for the women's trade. This is open, heelless, with a strap at the back. All this Koolon footwear is being made in Pretoria in automatic machines with a series of stations. Interchangeable lasts are used in the moulds.

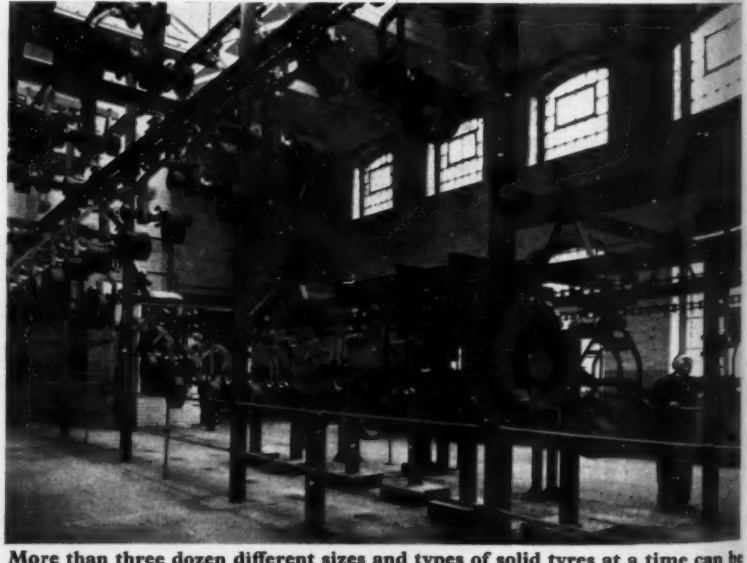
Domestic Ware

This firm is also making a range of plastic articles for the hardware trade. Although many of the items are supplied from stock, the company is also making any required articles to customers' specifications. The domestic ware is being sold under the trade mark of Rainbowware and it is claimed to be unbreakable, in which respect it differs from the bakelite plastics that have long been used in South Africa, where they have often proved to be brittle when used carelessly. The range also includes such items for the brush and broom trade as nylon, acrylic and styrene bristles, and engineering users are supplied with nylon nuts, bearings and liners among other needs. Bottles and bottle closures are in large production, together with phials, battery caps, roof washers, chair ferrules, oilways and reflectors. Many items in sintered plastic are now used locally because they are light, durable and non-corrosive.

New Shell SB Rubber

'Cariflex' S-1509

The Shell Chemical Co. have added to their range of Styrene Butadiene rubbers a low Mooney viscosity material 'Cariflex' S-1509. This is a type similar to S-1502 but with a raw Mooney viscosity in the range 30-38. 'Cariflex' S-1509 is currently offered at 22d. per lb. ex UK store in film wrapped or talc-coated bales. The rapid flow properties of this material should find ready acceptance for moulding applications and also in the manufacture of chemically-blown sponge products.



More than three dozen different sizes and types of solid tyres at a time can be handled in the Dunlop Rubber Company's factory at Cambridge Street, Manchester, under a mechanization scheme recently introduced as a result of the increased demand for fork lift truck tyres. During maturing periods the overhead conveyors act as storage space, enabling full use to be made of all available factory space while avoiding distortion of the product in its unvulcanized state. Solid tyres are now being made for commercial use from the polyurethane type of synthetic rubber, and are marketed under the name 'Duthane'

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VIEWS and REVIEWS

Isocyanates at Elevated Temperatures

'THE Reactions of Isocyanates and Isocyanate Derivatives at Elevated Temperatures' by J. H. Saunders (Moray Chemical Co., New Martinsville, W.Va) is an 'original publication' issued by *Rubber Chemistry & Technology*, forming the first feature in the April-June 1959 number (337-345 + 18 literature references).

Introductory

In his introductory remarks the author points out that the reactions of isocyanates at moderate temperatures are generally well known, but that at elevated temperatures they may be somewhat less familiar and are often complicated by subsequent reactions of, and with the initial reaction products. In his present review of this important subject the author 'attempts to present the most essential reactions which may be expected of three commercially significant structural groups, isocyanate, urea and urethane, at temperatures in the approximate range of 100-300°C.'

Importance of Subject

The author expresses the view that the reactions surveyed in his paper are 'of great importance' in designing polyurethane and polyurea structures which will have maximum temperature resistance, and in understanding changes which may take place at elevated temperatures, and, after a brief reference to the structural changes which may take place (i.e. to theory), he proceeds:—

'The success to which these reactions have been adapted to polymer chemistry may be illustrated by the existence of flexible urethane foams which show very little change in loadbearing strength after 15 months at 100°C., urethane elastomers which may be used for short times to temperatures of 130-150°, an experimental 1 lb. per cu. ft. rigid urethane foam which is dimensionably stable for five days at 200°, and a urethane wire enamel which retains adequate electrical and physical properties after ageing for several thousand hours at 180° or 100 hours at 250°C.'

Isocyanate Reactions

In section II of his paper Saunders discusses *Isocyanate Reactions* under subheadings 'A. with active hydrogen compounds' and 'B. self condensation.' In this, as in other sections of his review, previously published tables of figures, inferences as to reactions, structure practical points, etc. by various authors, including such by the present one with various colleagues, are welded by Saunders into a publication which strikes me as being of more than conventional interest and importance.

As regards 'A' (above) he (Saunders) remarks: 'At low or moderate temperatures the reactions of isocyanates are usually relatively simple, normally involving addition of an active hydrogen compound to the nitrogen-carbon double bond.' Then follows an example, and a discussion as to what may occur at elevated temperatures.

With regard to 'B. self condensation' (above), the work of various authors has shown (*cf. references*) that in addition to the simple reactions, other isocyanate reactions, not normally occurring at r.t. may also occur at elevated temperatures—e.g. self condensation, dimerazation, trimerization and carbodiimide formation. This subject is further discussed at some length.

Isocyanate Derivatives

In section III Saunders deals with the 'Reactions of Isocyanate Derivatives.'

a. Urethanes. The stability of urethanes varies greatly, according to structure. Those from tertiary alcohols decompose readily at temperatures as low as 50°C., but those from many primary and secondary alcohols may change only slowly at 150-200°. However, environment (i.e. presence of other reactants and catalysts) greatly influences stability. At this point the author discusses the three general types of reactions which may take place as a result of thermal decomposition (*5 literature references*), briefly:

1. Dissociation to isocyanate and alcohol; 2. Formation of primary amine and olefin, and 3. Formation of secondary amine (*examples given*).

In addition to the three decomposition reactions mentioned above, urethanes may undergo reaction with a variety of agents which add to a carbonyl group.

b. Ureas. Substituted ureas are known to dissociate to the corresponding isocyanate and amine at elevated temperatures. Thus, vapour density measurements have shown diphenylurea to be 99% dissociated at 370°C.

Catalysts

In a discussion on catalysts, the author points out that although the tertiary amines are among the most commonly used catalysts for promotion of isocyanate reactions which occur at moderate temperatures, these are not very potent for the reactions with active hydrogen compounds discussed in his survey. Catalysts which have a very vigorous effect 'on some or all of the reactions in his survey are the strong bases, e.g. NaOH, NaOR, and R_4NOH, and metal catalysts, e.g. cobalt naphthenate.

Conclusions

Amongst the conclusions mentioned by Saunders are:—

a. Studies with model components have shown that a variety of reactions may occur at 100-300° in molecules containing isocyanate, urea and urethane groups, and as most of these reactions are subject to catalysis so that they may be induced to take place at lower temperatures. '*These reactions are quite important as they may affect the production and practical use of polyurethanes and polyureas.*' (*Note.* Italics are the reviewer's).

COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

by **DR SCHIDROWITZ**

b. Referring to matters summarized in Conclusions (e.g. proper selection of components, rate of cure control, temperature stability, catalysts etc.) the author's overall opinion is that 'Many thoroughly tested applications of polyurethanes and mixed polyurea-urethanes show that it is readily possible to produce such polymers with excellent thermal stability.'

In the above survey I have attempted to indicate some of the 'high spots' in a review by a well-known worker and authority on a difficult subject, a subject having a bearing on a rapidly developing branch of industry with obvious links with polymer chemistry and with rubber and plastics manufacture. I have no hesitation in recommending its close study to technologists connected with the chemical, and with the elastomer and plastics industries in particular, and, in this connection, would draw special attention to the list of references to the literature, which is, I think, particularly notable, not only for the names of authors and subjects, but also, as indicating the importance of the subject as a whole.

Isomerization in Polyisoprenes

Part II of 'Cis-Trans Isomerization in Polyisoprenes' by J. L. Cunneen, W. P. Fletcher, F. W. Shipley and R. I. Wood (BRPRA), constitutes Publication No. 305 of the research programme of the British Rubber Producers' Research Association. This is reprinted from IRI *Transactions* (1958, vol. 34 (6), 260). The reference to Part I reads: 'Part I, J. I. Cunneen and F. W. Shipley, *J. Polymer Sci*, 1959. In the Press.' Both Part I and Part II deal specifically with 'Improvement of the Low Temperature Properties of Natural Rubber by Reaction of Thiol Acids with Dry Rubber.'

The summary of Part II is as follows:—'Natural rubber can be modified by reaction with a thiol acid on a mixing mill to a form which crystallizes much more slowly at low temperatures. The preparation, processing behaviour and physical properties of this modified rubber are described in detail.' The interesting, but—as it seems to me—somewhat complex subject, discussed in the above paper should be studied in detail in the original with a view to a full appreciation.

Mastication

Part 8 in the series on 'Mastication of Rubber,' by D. J. Angier, R. J. Ceresa and F. Watson (BRPRA) relates to the 'Preparation of Block Polymers by Mechanical Shear of Polymer-Monomer Systems.' This paper, which constitutes Publication No. 306 of the BRPRA research scheme, was originally printed in the *Journal of Polymer Science* (1959, XXXIV, 699-708). The introductory summary says: 'It is now reported that polymerization initiated by mechanical degradation occurs with a wide range of polymer-monomer systems and constitutes a general method of preparing block polymers on a scale suitable for evaluation of properties or even for commercial production.' This last sentence is concluded by a reference (No. 5) to 'British Patent Applications, 32031/55, 14107/56, 35908/56, 18907/57, 21881/57. The summary concludes: 'Two complementary polymer-monomer systems have been studied in some detail.'

Stress Relaxation and Ageing

'Stress Relaxation During the Thermal Oxidation of Vulcanized Natural Rubber' by J. R. Dunn, J. Scanlan and W. F. Watson (BRPRA), which constitutes Publication No. 307 in the research scheme, has been offprinted from the *Transactions of the Faraday Society* (1959, No. 436, 55, April 1959).

The authors have applied the method (details previously described; *cf. refs. in paper*) of stress relaxation measurement to the investigation of the ageing (in temperature range 80-100°C.) of NR vulcanized by dicumyl peroxide, with a tetramethylthiuram disulphate recipe, a sulphenamide-sulphur recipe, and by sulphur alone. Remarks made by the authors are as follows:—

(a) The degradation of those vulcanizates prepared without elementary sulphur is autocatalytic and is retarded by small quantities of antioxidant. It is concluded that network breakdown in this case . . . is due to scission at random among the isoprene units of the polymer chains, occurring as part of an autoxidative reaction of the type which takes place in low-molecular-weight olefins.

(b) The ageing of the sulphenamide-sulphur and unaccelerated sulphur vulcanizates shows marked differences. It does not show the characteristics of a chain reaction nor any other obvious similarity to olefin autoxidation. 'No positive conclusions have been reached regarding the mechanism of ageing of these vulcanizates.'

Notes

'*Enjay Butyl Bulletin No. 8*' relates to 'Enjay Butyl for Mechanical Goods.' The purpose of this bulletin, it is remarked, is to present some compounding formulations, both black and light coloured, in the 40-80 Shore 'A' hardness range' that may serve as a guide in designing high quality moulded and extruded items. Some general processing information is also included.' In a section headed 'Mixing and Processing' the following general remarks are put forward.

'Butyl, because of its greater impermeability to gases and moisture vapour, as well as its greater stability against mechanical breakdown, favours higher processing temperatures than natural rubber or SBR. In many instances vulcanizate properties are also enhanced by the use of higher processing temperatures.' This is followed, in tabular form, by particulars relating to Banbury Mixing and to Mill Mixing respectively, and by remarks on Moulding Compounds and Extrusion Compounds. Suggestions for compounds for Moulding and Extrusion respectively, are contained in Tables I and II. (*Bulletin* issued by Esso Petroleum Co. Ltd).

PHILIP SCHIDROWITZ

CIC Medal

Richard H. Manske, director of research, Dominion Rubber Co. Ltd., Guelph, Ontario, was presented with the CIC Medal at the 42nd Annual Conference of The Chemical Institute of Canada.

This Medal is awarded annually by the Institute for outstanding contributions to Canadian chemistry and chemical engineering and is the highest honour the Institute can bestow. Made of the rare metal palladium, it is donated each year by The International Nickel Company of Canada Ltd.

Questions Corner—85

(Second Series)

359. What methods can be used for a study of the chemical reactions occurring in condensation polymerization?

360. What is meant by 'number-average' and 'weight average' when discussing the molecular weight of high polymers?

361. What is the ZST Test for polythene?

362. Are there any general guides for choosing an adhesive for thermoplastics?

(Answers next week)

Answers to Questions Corner—84

355. Some relatively new thermosetting polymers have been prepared by interacting epoxy resins with polyamides prepared from polymerized vegetable oil acids and polyamino compounds. There are several important differences in the products obtained by this reaction compared with the reaction products of epoxy resins with amine hardening agents.

One important advantage is that the pot-life of the epoxy and polymerized vegetable oil acids is quite long because the heat of reaction develops slowly and thus permits the mixing of large batches. These polyamides are relatively non-toxic and virtually non-votatile, while the ratios of the reactants is less critical than when conventional hardening agents are used. There is a marked increase in toughness and impact strength.

When these polyamides are used no additional catalysts, hardening or curing agents are required. In other respects the reaction products of these new materials with epoxy resins are similar to other conventional reaction products, e.g. low shrinkage, good wettability, cure without pressure, etc.

356. Many plastics are used for medical purposes and give no trouble as regards toxicity. Nylon is being used in surgery and there is little or no tissue reaction. The acrylics are being used successfully for bone replacements, artificial eyes, dental uses and other prosthetic applications. It has been reported, however, that when placed in certain regions of the human body they should be used with caution because there is some evidence to show that tumor formation, tissue reaction and sepsis can occur. (Ind. Med. and Surgery 1955, *24*, 491.)

Polythene is used in surgical repair, suture tubing, skull covering, hernia applications and arterial reinforcement with no apparent adverse effect. Silicones are non-irritating and polystyrene presents no health hazard from oral ingestion or skin contact. It is inert and non-toxic.

Vinyl resins, in themselves, are non-toxic but when compounded for certain applications some of the ingredients used are toxic and care must be exercised in their selection. It is not advisable to use lead or cadmium compounds and some plasticizers are known to have toxic effects.

357. Silicone resin hydrolyzates have an acid number due to some of the hydroxyl groups that remain on the silicone atoms. These groups may be removed without removing a proportionate amount of the total hydroxyl groups present. A method has been developed (Ind. Eng. Chem. 1956, *48*, 104) for the evaluation of this acid number. The higher the number the slower the curing rate of the resin.

Properly cleaned glass fibre, or fabric, uncontaminated by cleaning reagents, may have an acid reaction in organic media, which can be shown, both by the use of the acid number solution used for resins and by determining the gel time of a silicone resin with glass present.

Two methods for evaluating the effect of glass fabric on the curing rate of silicones are outlined. Both methods are empirical but should be of value to the fabricator of silicone-glass fabric products.

358. There are several types of asbestos but the most important is that of chrysotile, a hydrated silicate of magnesium. Chrysotile is found in the base Serpentine rock and mechanical methods are used to separate the asbestos veins from the rock and, in turn, separate the individual fibres which are the thinnest and softest inorganic fibres known. They are unique in that they always have the same diameter and have a circular cross-section.

Asbestos has many advantages, including heat and flame resistance, chemical and water resistance, is a low cost filler, is excellent for thermal insulation, has good electrical properties and, as a filler, enables control of the plasticity of the resins.

Asbestos is mainly used in the form of fabrics, felts, mats and papers, but is also used as chopped fibre. The fabrics and felts can be readily handled in wet-lay-up methods but felts are very satisfactory for handling in unsupported sheets. All types readily impregnated with resins.

One type of phenolic resin-impregnated asbestos felt, Durestos, has found many applications in industry.

(More questions next week.)

New Container

An interesting development in easy-opening containers was shown by the Iridon section of the Commercial Plastics Group at the Packaging Exhibition. The container is made up of a vacuum formed base, made from Craytherm non-toxic PVC sheeting, and a sheet of Iridon clear PVC film forming the covering lid and heat sealed to the base so that the container is hermetically closed. The containers are suited to food packaging for sardines, pilchards, anchovies etc.

Croxton and Garry Ltd., 16-18 High Street, Kingston-on-Thames, Surrey, have been appointed as sole agents for all the materials manufactured by Messrs. Merck & Co. Inc. Marine Division, of Rahway, New Jersey, USA. The most important compounds from the rubber industry's point of view are Maglite D, Maglite K and Maglite Y, which are finding applications in natural rubber, neoprene, butyl, Viton, Hypalon, etc.

Francis Shaw and Co. Ltd. announce that Mr R. D. Gerrie was appointed to the board of directors of the parent company on July 29 1959. Mr Gerrie will continue in office as managing director of Francis Shaw (Canada) Ltd., who manufacture Shaw equipment for Northern America and handle sales for the parent company on the American Continent.

Polly Ester Says . . .

'Masterbatch — Mr Batch's offspring'

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MEN and MATTERS

A Review of People and Events

by George A. Greenwood

MANY people will recall that when industrial conditions were just about at their worst in South Wales a great enterprise designed to bring new activity to the area was launched by the establishment of the Treforest Industrial Estate, near Pontypridd. A comparatively early settler among the various companies which took up sites and erected factories was Plastic Engineers Ltd., which has since been specializing in the production of various plastic articles, including containers for a number of trades, as well as the manufacture of precision engineering components in the making of nylon.

A half-yearly statement is just forthcoming from its chairman, Mr George Cantley, the well-known Cardiff stockbroker and industrialist, who says that the company's newer products which include the plastic filters marketed under the name 'Strylon' are now contributing usefully to profits and that the company is about to produce 'Stylar' plastic furniture legs. Among the other newer products are extruded rod and sections in nylon sold under the trade name 'Extrudlon.'

It is not surprising, in view of all this enterprise at Treforest, to hear that during the six months concerned, profits had bounded up to £27,900, compared with £14,700 for the same period last year. It looks as though Plastic Engineers, in opening up at Treforest, did something for South Wales. Treforest, in turn, has done something for Plastic Engineers. Mr Cantley, by the way, is also on the board of Coated Metals Ltd.

Mrs. Huggett's Pancake Mixer

If it is a fact, as they say, that the appearance of a product in a radio programme is proof that it has 'arrived,' then let me say a word about what happened at the week-end when the household where we 'Meet the Huggetts" was besieged by one of those importunate door-to-door canvassers and salesmen. On this occasion, however, he was giving out, for to her intense surprise, Ethel Huggett, that excellent housewife, received, simply as a gift, a plastic pancake mixer. It was all quite genuine, with no hanky-panky, and she found it most useful.

We are not concerned with the denouement, however. This was the arrival, a few days later, of a bewildering supply of articles, including a pair of roller skates for Bobby and a tennis racquet for Jane which, it turned out, had been sent without request for payment on the 'never-never.' But the point remains that the script writer did hit upon that plastics mixer as the bait for the rest of the deal.

It might well be, of course, that this is genuinely one of the newer domestic products. Another new domestic gadget certainly is a handy plastic colander. One of my women colleagues who has bought one for 7s. 6d., praises it. This colander has solid grips on each side, she says, a base to stand on, and holes *only at the bottom*, so that no water splashes out at the sides.

Personal

Fitting tribute was paid last week at the thirty-third annual general meeting of Allied Sumatra Plantations Ltd. in London, to the recent retirement of Mr A. L. Mathewson, O.B.E., from the company. His successor in the chair, Mr F. W. Harper, said how much the remaining members of the board regretted Mr Mathewson's departure. He had, in fact, been closely identified with Allied Sumatra Plantations since the company was formed, and anybody who knows him is only too well aware of his vast experience in the world of rubber growing. We shall join Mr Harper in wishing Mr Mathewson a long and happy retirement, but I myself am wondering to what extent it is going to apply to the many other companies, nearly 20 in number, of which he is, or has been, chairman or director. These include, of course, Harrisons and Crosfield and the Central Sumatra Estates, as well as the Rubber Plantations Investment Trust.

The Dunlop Masters Golf Tournament, played in Ireland for the first time at Portmarnock near Dublin on September 19 and 20, was won by Christy O'Connor (Royal Dublin). He was afterwards presented with a cheque for £1,020 and a silver salver by Mr G. E. Beharrell (*left above*)**, chairman of the Dunlop Rubber Co.**

A well-known figure in the world of rubber is Mr A. H. Thomas, by virtue of his long association with British Belting and Asbestos Ltd. Mr Thomas has been elected president of the Purchasing Officers' Association for 1959-60.

The first social occasion since the Waste Rubber Merchants' Association changed its title to the Waste Rubber and Plastics Merchants' Association of Great Britain takes place this month when, on Saturday October 24, the annual dinner and dance is to be held at the Berkeley Hotel, London.

A Social Service

The directors and secretary of the Leyland and Birmingham Rubber Co. Ltd. have sent me a copy of their report and statement of accounts for the year ended June 30 last, and I have found these most interesting. Facts and figures will, I imagine, be surveyed elsewhere, but there are one or two points about this document which particularly interested me.

One is the new form, more expansive and clearer, in which the Company's activities and position are stated. Another is the explanation by Mr R. W. Lunn, C.B.E., M.Sc., the chairman, of a special resolution which will be put before the annual meeting later in the month. He says that the Board has had to give attention to the provision to the Company's superannuation scheme, and has taken the advice of specialists. The legal advisers say that the existing subclause in the Memorandum of Association is ambiguous, and needs revision. The new clause will give authority:

> 'To grant pensions or gratuities to any employees or ex-employees and to officers and ex-officers and

to directors and ex-directors of the Company or the relations connexions or dependants of any such persons and to make payments towards insurance and to subscribe or guarantee money for charitable or benevolent objects or for any exhibition or for any public general or useful object or for any purpose which the Company may consider conducive to its objects.'

Mr Lunn said he finds in this nothing which conflicts with any past events, and nothing which disturbs the future. He asks shareholders to join him in accepting this new statement of what the Board should be able to do for those who have served their Company. It is very much in line with modern thought and ideas, and I should imagine there is no question about the result.

Aeropreen Foam

A new type of plastics foam, polyether foam, introduced earlier this year and manufactured by Aeropreen Products at their factory—the largest plastics foam plant in Europe—at High Wycombe, is finding more and more use as overlays and seat squabs in passenger cars. Mr Davis Millar, managing director, announced the other day that Standard-Triumph, Rootes and the Ford Company are among those using it. In fact, the motor industry is now taking somewhere round 35% of the company's output.

Chairman's US Visit

Mr A. S. Bishop, chairman of the Goodyear Tyre and Rubber Co. (Gt. Britain) Ltd., is, I am told, sailing from Southampton on October 2 on the 'Mauritania' for a six to eight weeks' trip to America. Mr Bishop, who will be accompanied by his wife, will visit Goodyear headquarters at Akron, Ohio.

A man very well known to industry visitors at the Wolverhampton factory of the Goodyear Tyre and Rubber Co. Ltd., is Mr E. Dove, the training officer, who recently completed 30 years' service with the company. Mr Dove joined the organization in the factory, was transferred to development and then joined sales, in charge of training courses, in 1946, the work he has been engaged in handling since that time. In the illustration he is seen receiving his 30-year service pin award from the managing director, Mr M. S. Meyer

NR-SR COMPETITION

The chairman of the Prang Besar Rubber Estate, Mr R. O. Jenkins, says in his annual statement that the fact that the natural rubber price in the US is 50% higher than general purpose styrene-butadiene is a 'shot in the arm' to synthetic rubber developments.

He says the rapid advance of the synthetic rubber industry, the variety of its products, the stability of its price and its emphasis on provision of technical services all point to the challenge given to natural rubber.

The natural product was still being used in a wide range of conditions with advantage over any synthetic but it was just this that gave the stimulus for the production of *cis*-polyisoprene and for further intensification of synthetic research.

Referring to the dispersal programme of natural rubber stocks by the British Board of Trade and by the US authorities he said that the disposal rate may not cause natural supply to exceed demand but it may be expected to halt the recent steady price rise in natural rubber.

New Designs added to Swedish Perstorp Range

Perstorp Products Ltd., Orpington, Kent, have added three additional designs to their Swedish Perstorp range. These are Light Oak, Swedish Pine and Tracery, a line pattern available in six shades. Retail prices, 5s. 9d. per sq. ft. cut to any size.

Mr M. D. S. Becher has been appointed a director and elected chairman of the Malayan Para Rubber Co. Mr B. W. Meaden, Mr R. James and Mr C. R. Gray have also joined the board. Mr W. L. Cowley, Mr C. R. Slowe and Mr J. R. Keswick have resigned as directors. Mr Gray takes over as secretary of the company from Burt Taylor and Co., who have resigned. An offer by the Contanglo Banking and Trading Co. for the shares of the company became unconditional last month.

BTR APPOINTMENT

BTR Industries Ltd. announce that as from October 1 1959 Mr P. W. Howard will relinquish the office of

DR W. D. SCOTT

managing director but will remain a director and the deputy chairman of the company.

Dr W. D. Scott, F.R.I.C., F.I.R.I., has been appointed to succeed Mr P. W. Howard as managing director as from the same date.

A conference on Fuel Economy through Automatic Operation organized by the Combustion Engineering Association is to be held at the Royal Hotel, Scarborough, November 3 and 4 1959.

HAPPY BIRTHDAY

Birthday greetings to Mrs Fordyce Jones for October 1; Mr G. J. Aitkens (Pirelli, Ltd.) and Mr R. H. Craven (accountant, IRI) October 2; Mr H. G. W. Chichester-Miles (Empire Rubber Co. Ltd.) October 5; Mr S. D. Dutton (Veedip, Ltd.) October 6; Dr W. Cooper (Central Research Div., Dunlop Rubber Co.) October 9; Dr Philip Schidrowitz and Mr R. W. Cook (Central Research Div., Dunlop Rubber Co.) October 13; Mr A. E. T. Neale (Chemical Research Dept., Fort Dunlop) and Mr F. H. Smith (Semtex, Ltd.) October 17; Mr C. D. L. Smith (Wilfrid Smith Ltd.) October 18; Mr C. H. Hargrave (Phillips Patents Ltd.) October 19; Mr A. L. Soden (RABRM) October 22; Mr A. H. Pendree (Goodyear Tyre & Rubber Co. (GB) Ltd.), Dr H. J. Stern and Mr A. R. Bloxham (works manager, Lastex Yarn & Lactron Thread) October 26; Dr H. Simon (Messrs. Evode, Ltd.) October 30; Mr P. Worth (India Tyre & Rubber Co., Ltd.) October 31.

∴Duly authenticated dates for inclusion in this feature will be welcomed by the Editor.

Plastics Materials and Processing

PARIS CONVENTION—5

DR W. GEILENKIRCHEN, of Farbenfabriken Bayer, spoke on 'The Polycarbonates, a New Group of Thermoplastic Materials,' at the recent 5th International Chemical Exhibition Convention in Paris. The lecturer dealt with the material sold by Bayer under the name of Makrolon. He described the properties of Makrolon moulding granules and the results which they gave. Great transparency was one feature, so that the material could be used as a substitute for glass in lamps, neon tubes, table glassware, bottles and the like. It was serviceable up to 100 to 110°C., resistant to light and to tropical temperatures. Only a small portion of the possible applications had as yet been investigated.

Makrolon could be extruded and injection moulded without difficulty on all normal types of machine. It was important to keep the material absolutely dry since moisture led to unsatisfactory results. With this in view, the material would, in future, be delivered in sealed containers.

The melt viscosity was comparatively high being 100,000 poises at 240°C. but falling to 10,000 poises at 300°C. Time was almost without influence on the melt viscosity. The temperatures given, *i.e.* 240 to 300°C. were suitable for injection moulding; over 300°C. there was some decomposition. Moulding pressures could reach 1,000 to 2,000 kilogrammes per square centimetre (14,250 to 28,500 psi).

In extrusion, preplasticizing screw was advisable for injection moulding; a slide showed a 250-gramme injection moulding machine making imitation glass bowls. The shrinkage was 0.8%. Moulds should be well polished with short wide injection channels and mould temperatures up to 120°C. could be used. A small amount of zinc stearate avoided any tendency to stick. Makrolon bottles were used for oil, milk, pharmaceutical products and beauty preparations.

Extrusion

Any type of extruder could be used provided the temperature was high enough; the temperature at the nozzle should not be lower than that at the end of the screw. A screw having a length 15 times the diameter was recommended with a 1.4 compression and a braker plate was advisable to increase pressure. Extrusion temperatures were in the region of 250 to 300°C. Should porosity be noticed, this was due to moisture (see above).

Tube could be extruded and blown to form sheets. The sheet could be stretched which increased its strength and such sheet could be used as a photographic film base. Films could be stuck, printed and metallized. Sheets could be formed as usual and rigid tubes could be extruded.

Other Properties

Since it was a polyester, Makrolon did not resist hot water. It could be easily bored, turned, punched and worked generally in a similar manner to aluminium; a slide of a chess set turned from a rod was shown. Granules could be moulded into sheets.

A number of questions led to the following additional information. Makrolon was incompatible with other materials so that all parts of the machine must be clean. Other plastics scrap would spoil the results but 10 to 20% of Makrolon scrap could be re-used. Above temperatures of 50 to 60°C. with high humidity, Makrolon was not satisfactory. The properties were similar to the polyamides but the resistance to abrasion and to alkalis of polyamides was better. On the other hand polycarbonates such as Makrolon showed even better resistance to water, the maximum absorption being 0.2%.

Density was 1.2 and the price, 10 marks per kilo, was much higher than that of other plastics with which Makrolon might otherwise compete. The minimum thickness the sheet could be calendered was .02 millimetre but .003 millimetre thick films could be deposited from solution.

Resistance to chlorine and bromine was good as well as to ultra violet light which did not cause yellowing, and the resistance to radiation was reasonable.

Welding by dielectric heating was not possible because the power loss was insufficient. The expansion coefficient was about the same as that of methyl methacrylate and adhesion to metals was poor.

Synthetic Rubber Upswing

MORE OF WORLD'S NEEDS MET

SYNTHETIC rubber demand in the non-Communist world outside the US 'is about to explode,' Mr J. W. Keener, president of the B. F. Goodrich Co., of Ohio, said in Arnhem last week.

Speaking at the official opening of the new synthetic rubber factory at Arnhem, Holland, to be run jointly by Goodrich and the Dutch rayon concern of AKU, Mr Keener said in 1958 the US consumed 880,000 long tons of synthetic rubber, about 65% of its total new rubber consumption. In 1962, his company estimated the US would consume 1,185,000 long tons of synthetic rubber, or 68% of its new rubber consumption.

Excluding the Communist bloc, countries outside the US in 1958 consumed 368,000 long tons of synthetic rubber or slightly over 25% of their total new rubber consumption. In 1962, this group of nations will consume an estimated 715,000 tons of types of synthetic rubbers in current production, or 40% of total new rubber. This represented a 94% gain in uses of synthetic rubbers by these nations in the short span of four years.

'To put it tersely,' Mr Keener said, 'substantially all the inevitable growth in the world's needs for new rubber must be met from increased synthetic rubber output because the rubber trees required to significantly increase natural rubber output have not yet been planted. This is the opportunity of CIAGO (N. V. Chemische Industry AKU Goodrich) and of other alert synthetic rubber producers.'

New Geigy Director

Geigy (Holdings) Ltd. of Manchester have announced that Lord Rochdale, O.B.E., T.D., D.L., has accepted a seat on its board.

Lord Rochdale is chairman of Kelsall and Kemp Ltd., wool textile manufacturers in Rochdale, also of its associated company in Tasmania, chairman of the Cotton Board and a past president of the National Union of Manufacturers; he has recently completed his term of appointment as a member of the Board of Governors of the BBC.

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Plantation Commentary

POLITICAL OUTLOOK

by our Malayan Correspondent

WHILE the new Government in Singapore, with the left-wing People's Action Party in power, has not exactly accepted its responsibilities like a lamb, the first weeks of its power have been much quieter than many expected. Business goes on much as before and at the time of writing no major changes have been ordered.

The new Government has demonstrated that it will be authoritarian, and with the new Ministers industriously settling to their new jobs there are likely to be some interesting changes in the future.

The Prime Minister, Mr Lee Kuan Yew, has already scoffed at fears that there would be a 'panic and a collapse of business' when the PAP came into power. At a rally, during which he told the harbour workers that they intended to see the port heightened in efficiency, he said, 'If you watch the stock market, a true reflection of the tone of the market as well as the health of the community and trade, you will find that it has strengthened, stiffened and steadied. That is the measure of the proof that our detractors were liars and rogues. They themselves did not believe that we were a lot of stupid men who wanted to ruin Singapore.'

Mr Lee's statement, however, cannot belie the fact that many businessmen still have an eye on the Federation of Malaya as a possible place to move to if conditions become too difficult in Singapore. The share market report for the week during which Mr Lee was speaking spoke of the quietest week of the year in the Malayan share market with turnover greatly reduced. Prices held but 'until operators have more definite information regarding the new Singapore Government's economic and fiscal measures conditions are likely to remain quiet.'

Many of the early measures taken by the Government refer to 'yellow culture,' a phrase which seems to cover most of the less dependable aspects of Western culture. No exception can really be taken to these measures unless the liberal view is held that within reason everyone is entitled to enjoy themselves as they like and even go to the devil in their own way.

For a start, and among the measures taken, juke boxes have been banned, which many will find a relief, and also pin tables, a gambling game which was widespread in amusement arcades and attracted hooligans in large numbers. A warning has been given against books which the Government might consider 'yellow,' and film distributors have been told that films that are considered pornographic will not be allowed. About 30 have been withdrawn from distribution.

The Government has also announced that it is making a careful check on waitresses in Singapore bars, a not very edifying employment for the pretty young girls concerned.

Rock 'n' roll had been banned on the Government radio and the number of sentimental songs to be played is to be reduced.

On the more serious side in the much more serious Singapore of today, the Government has reduced the salaries of Ministers and is clearly aiming at a sharp reduction in Government expenditure to try to reduce the deficit expected in the Government Budget this year, a deficit that developed before the PAP came into power.

The Internal Security Council has been set up with three Singapore and three British representatives, with Malaya's Minister of Defence, Dr Ismail, as the seventh man who will represent the Malayan point of view.

There is clearly much that is yet to come from the new Singapore Government, but it has undeniably got away to a good start.

Sir G. F. Clay

Sir Geoffrey Fletcher Clay, the head of the Malayan rubber industry's research programme, is engaged in a two-month visit to Britain and the United States. It is hoped that the research programme can be improved through better co-operation and co-ordination.

During his visits, Sir Geoffrey is meeting those in charge of the research and development of natural rubber in these countries. It is understood that one of his main aims is to reduce the unnecessary overlapping of work carried out by the Malayan Rubber Research Institute, the British Rubber Producers' Research Association, the Natural Rubber Development Board, and the Natural Rubber Bureau. It may be necessary to reorganize these establishments to produce the maximum results with the minimum of effort and expenditure.

Since his arrival in Malaya, Sir Geoffrey has spent a good deal of his time getting to know various aspects of the industry. This has included the various research units operating in Malaya where he has been particularly interested in the amount of liaison between them.

During his stay in Britain he hopes to meet representatives of the British Rubber Manufacturers' Association and synthetic producers.

The Assistant Controller of Research, Dato Shamsuddin bin Nain, said, 'Sir Geoffrey will submit a report to the Government on his return from Britain and America. This is the first time that an effort is being made to streamline the research and development programme of natural rubber. It may be that some of the organizations engaged in research will have to be reorganized.'

Sir Geoffrey said that while he was in the United States he intended to pay particular attention to the new synthetic rubber, polyisoprene. 'One wants to know what is the potential output of that rubber, what the price level will be and what competition there is between it and natural rubber,' he said.

He also wanted to get an idea of the research carried out in America on synthetic rubber and the view of synthetic manufacturers in relation to natural rubber. He planned to see people in the State Department concerned with developments in South-East Asia.

Australian SR

Malaya has been warned that natural rubber may face stiffer competition in the Australian market in the years to come when the Australian synthetic rubber plant comes into operation. The warning was given by Mr Neil Douglas, a rubber chemist and a leading authority on natural rubber in Australia and New Zealand.

Mr Douglas said that the synthetic plant in Australia may go into production in early 1961 with an initial output of 30,000 tons a year. It seemed likely that the cost of the product would be considerably dearer than that of the tyre grades of natural rubber but once the plant was producing a market would have to be found for the product somewhere and the tyre industry was by far Australia's biggest rubber consumer.

'Natural rubber will hold its position if it is permitted to compete with synthetic on a completely free market,' he said. 'If the home-produced synthetic is completely consumed our percentage of natural rubber consumption will be much lower than it has been in the past. I am hoping that this will not happen.'

Mr Douglas pointed out that Australia's total rubber consumption had risen from 49,000 tons to 53,000 tons last year, of which only 31% was synthetic. He was aware that Malaya was keeping a watchful eye on the situation and Malayan producers would be well represented in Australia.

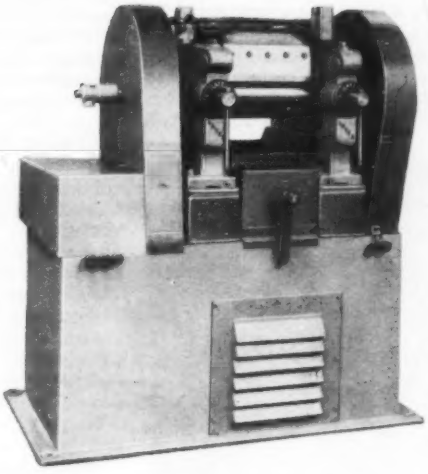
Commenting on the need for standardization in natural rubber, he recommended three grades: high, medium and low. 'And there must be exactly the same physical qualities in every batch of each grade,' he said. 'It must never vary.'

However, not everyone shares Mr Douglas's gloomy view of the future of natural rubber when the new synthetic plant comes into operation. The Australian Trade Commissioner, Mr

Latex Engineering Co

The illustration on the left represents: Steam-heated 2-daylight 12½/25 Ton Press.

On the right:— Double Geared Motor Driven 2-speed Laboratory Mill.



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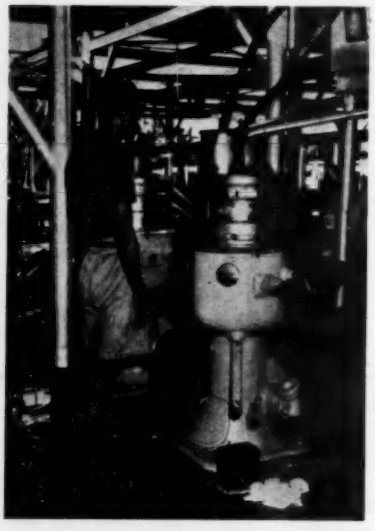
W. D. Cairns, felt that the synthetic manufacturers would have the most cause to worry.

'I don't think in the long-term that there will be a decline in Australia's consumption of natural rubber,' said Mr Cairns. 'If the Australian plant is going to affect anybody it will be the producers of synthetic rubber at present imported into the country. The intention is eventually to replace all imported synthetic rubber with the home-made product.'

The majority of Australia's synthetic rubber at present came from the United States with a smaller amount from Canada.

The synthetic plant being set up in Australia is a petro-chemical plant, according to information here, in which several firms have an interest.



These pictures, from our Malayan Correspondent, show some of the stages in the production of SP crepe. *Left*, **one of a battery of latex centrifuges.** *Centre*, **latex, after leaving the centrifuges, is mixed with chemicals in tanks such as these and then vulcanized for two hours at 85° C. by steam.** *Below*, **SP crepe after leaving creping machines**

Plantation Wages

The new wage agreement in the rubber industry which came into effect on June 1 might well mean bigger pay packets for many of the industry's workers, said the president of the Malayan Planting Industries Employers' Association, Mr D. E. Teale. He emphasized this point strongly in his speech to the annual meeting of the association.

The new wage agreement contains incentives to higher productivity which will enable the good worker to earn more than his 'less skilled and less energetic neighbour.' It may be that the slower worker will get less than he did before, though he will be protected by a guaranteed minimum wage in the agreement.

Mr Teale told the meeting, 'From the employers' point of view the most interesting question which will be answered in the next few months is whether the incentive element in the scheme will be universally successful. If it is the happy result will mean bigger crops and bigger pay packets.'

An important point brought out by Mr Teale was that the association, which deals on behalf of its members with the National Union of Plantation Workers, has only 33% of the estates in Malaya as its members. On estates outside the association the terms and conditions of employment were generally inferior. One reason was that 'many prefer to avoid being bound to pay the standard wages to which our members are committed by agreement with the union.'

He felt that the time had come when there should be uniformity in the terms and conditions of employment on all estates in Malaya, a uniformity which could be achieved voluntarily or be imposed by legislation.

'Very recently in Britain,' said Mr. Teale, 'legislation has been passed which to some extent follows the type of legislation developed in Switzerland where the Government has the power to invest with the force of law all agreements entered into by bodies which represent a substantial proportion of employers and workers so that the benefits of these agreements can be applied uniformly to all workers in the industry. Consideration might perhaps be given to such legislation in Malaya.'

Mr Teale attributed some of the decline in membership of the association to the fragmentation of estates in which estates are bought, sub-divided, and then sold in small lots. He warned that where estates had been sub-divided not only had there been an immediate loss of employment for the managers, the staff and the labourers, but various services which used to be provided by the estates had now to be provided by the Government or were not provided at all.

'Where at one time the estates undertook the responsibilities of housing, medical and educational facilities, drainage, anti-malarial measures and water supply, the responsibilities must now be undertaken by local authorities,' said Mr Teale.

'It has been alleged that some of the fragments of once large estates are in the actual possession, although probably not in the nominal possession, not of smallholders but of comparatively big land owners who are able to evade the responsibilities and the expense imposed by the Labour Code which does not apply to estates under 25 acres.'

He added that it had been said that fragmentation was a means of satisfy-

ing a genuine land hunger. He felt that it would have been more to the economic good of Malaya if this land hunger was satisfied by opening up and utilizing the vast tracts of unexploited land rather than by a mere change of ownership of land which had already been developed.

Rubber Price

Malaya's rubber producers have been told that they should get used to a price of between 1s. 7d. and 1s. 10d. a pound for rubber by the retiring chairman of the Government Replanting Schemes, Mr S. E. Chamier. Expressing his personal views, he said that the producers, including smallholders, ought to be able to meet this price level if they had replanted or had new plantings.

He felt, however, that natural rubber had little to fear from synthetic if there was improved packing and better quality and the price could be kept within the 1s. 7d. to 1s. 10d. a pound limit.

'For the next few years at any rate Malaya should be able to sell without difficulty every pound of natural rubber that she can produce,' he said.

Those that did not replant must face the prospect of being forced out of business. Smallholders, however, could not do this without assistance and this assistance to smallholders for replanting purposes was likely to be a permanent feature of the Malayan rubber industry. He pointed out that if a man had 1,000 acres he could cut out 200 acres and replant without financial embarrassment. But if he owned four acres the cutting out of two acres posed a very serious problem since it would take six to seven years to bring the replanted areas to maturity.

Training Courses

Four neighbouring Governments have asked the Malayan Rubber Research Institute for help in setting up training courses on the various aspects of planting, says the director of the RRI, Mr C. E. T. Mann, in the institute's annual report. The requests have come from Borneo, Sarawak, Siam and Burma. Borneo and Sarawak contribute to the Malayan Rubber Fund.

Mr Mann points out that there is increasing pressure for such courses in Malaya itself from young Malayans, and he feels that the matter needs urgent attention. The institute can provide practical training courses in plantation practice.

Commenting on other aspects of the institute's work, Mr Mann says that an estate advisory service will in future be set up as another division of the RRI. In Washington the Natural Rubber Bureau makes constant contact with consumers who have shown keen interest in modified forms of natural dry rubber and concentrated latex developed by the chemical division of the RRI.

The institute maintains liaison with international rubber bodies and also co-operates with other research organizations in Indonesia, Sumatra, Java, Ceylon and Vietnam, particularly in the exchange of high-yielding planting material.

Japanese Synthetic Rubber

The first synthetic rubber plant to begin production in Japan was formally opened recently in Kawasaki, Japan, by officials of the B. F. Goodrich Company and Japanese Geon Ltd., Tokyo.

The $1,300,000 plant, with a capacity for producing 8,400 tons of rubber a year is owned by Japanese Geon, an associate company in which B. F. Goodrich holds an interest. It was designed and built under the supervision of the B. F. Goodrich Chemical Company Division.

British Standards

Testing Cellulose Acetate Flake

Three test methods which had not been completed when B.S. 2880:1957 was published are given in a new British Standard publication: Addendum No. 1 to B.S. 2880: 'Methods of testing cellulose acetate flake.' (Ref. PD. 3474).

The methods, which are described in conjunction with three full-page diagrams, are: 1. Determination of insoluble particles. 2. Determination of original colour, and colour after the heating of plasticized cellulose acetate. 3. Determination of viscosity loss on moulding. The 11-page specification provides full details of apparatus, procedure and methods of expressing results.

Copies of this publication may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London W.1. Price 4s.

Life Rafts — Canada

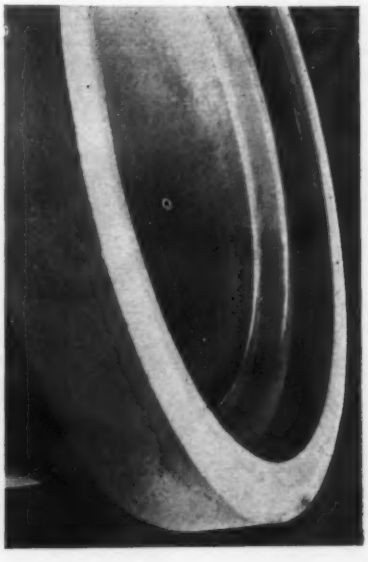
E. B. (Ernie) Peerless Ltd., 5934 Fraser Street, Vancouver 15, B.C., have informed the UK Trade Commissioner at Vancouver that they would like to represent a UK manufacturer of inflatable life rafts for deep sea shipping.

Manufacturers interested in this agency enquiry should write direct to the Canadian concern and, at the same time, notify the UK Trade Commissioner, The Mercantile Bank Building, 540 Burrard Street, Vancouver 1, B.C., that they have done so. BoT reference ESB/18494/59.

Mr W. Y. A. Wright has resigned from the Board of Rubber Improvement owing to pressure of his other business commitments.

USES OF RUBBER

Infiltration and its consequent disadvantages are eliminated in 'Tylox' flexible rubber-jointed drainage pipes now being marketed by the Mono Concrete Co. Ltd., West Drayton, Middlesex. The arrangement consists of a ring of natural rubber fixed into the socket of a pipe, *right*, with special mortar. The profile of the joint has projecting fins which provide a multiple seal. Ioco Ltd., Netherton Works, Anniesland, Glasgow, C.2, have recently commenced the manufacture of glass cloth coated with I.C.I. silicone rubber, *below*



Rubber Statistics

FRANCE — WESTERN GERMANY — CEYLON

INFORMATION recently released regarding the rubber situation in France shows that, during the five months ending May 31 last 46,957 tons of crude natural rubber and 5,077 tons of natural latex were imported, making 52,034 tons in all, compared with imports of 63,723 tons during the first five months of last year.

Actual consumption of natural rubber during these months amounted to 52,025 tons of crude and 5,632 tons of latex—57,657 tons in all (compared with a consumption total of 61,127 tons during the corresponding period of last year). Stocks of natural on hand at May 31 totalled 7,541 tons of crude and 1,096 tons of latex; stocks had in fact fallen by this date to little more than half their year-end level, when they had stood at 12,876 tons of crude and 1,651 tons of latex.

Imports of synthetic rubber during these months amounted to 24,307 tons, of which 16,896 tons came from the USA and 5,291 tons from Canada; during the first five months of last year imports of synthetic had amounted to 25,176 tons. Consumption of synthetic to the end of May totalled 27,143 tons, 18,908 tons consisting of S-Type and 4,038 tons of butyl, and stocks on hand at the end of the period stood at 6,044 tons, having fallen to this level from the year-end figure of 8,746 tons.

Western Germany

Imports of natural rubber into Western Germany during the five months to the end of May totalled 56,540 tons, of which 51,540 tons consisted of crude and 5,000 tons of latex (1958 imports for this period, 51,570 tons). Consumption total for the period was 56,678 tons (51,548 crude and 5,130 latex). Stocks on hand at end of May stood at 13,686 tons, having declined to this level from the January 1 figure of 14,400 tons.

Production of synthetic rubber in Western Germany during these five months totalled 14,472 tons, a considerable increase compared with the previous year's total of 6,254 tons, reflecting the entry into production of new synthetic plants in this country. In addition, 13,618 tons were imported; 9,881 from USA, 2,440 from Canada. Consumption of synthetic rubber amounted to 25,319 tons, an increase of some 5,000 tons or 25% compared with the previous year's figure.

During these five months, 16,496 tons of reclaim were also produced, an increase of nearly 1,000 tons over the previous year's production, while consumption of reclaim amounted to 16,118 tons as against 15,031 tons.

Ceylon

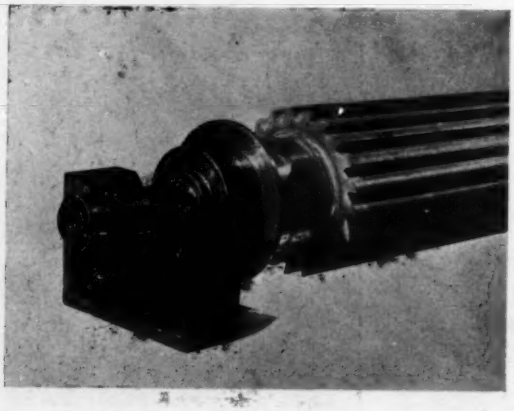
It is announced that during the second quarter of the year estate production in Ceylon amounted to 13,688 tons (first quarter's total, 15,565 tons). Production of sheet totalled 7,052 tons (8,202), while latex crepe totalled 4,525 tons (5,841); scrap crepe production went up from 1,151 tons in the first quarter to 1,693 tons.

Total exports of rubber, from both estates and smallholdings, fell from the first quarter's figure of 28,777 tons to 20,527 tons.

British Visqueen Acquires Spesco

British Visqueen Ltd., of Stevenage, the I.C.I. subsidiary which manufactures 'Visqueen' polythene film, has purchased the share capital of Spesco Developments Ltd. of Chertsey, Surrey. Spesco Developments are manufacturers of bags from polythene film and have based their development on films manufactured by British Visqueen. Spesco Developments will continue to operate from their existing premises at Chertsey.

Mr R. N. Kapur has been appointed a director of the Poonmudi Tea and Rubber Company.



A rubber roller, machined into 21 longitudinal ribs shaped like a milling cutter, and used in the manufacture of abrasive coated papers, has been manufactured by Paramat Ltd., 17 Rosebery Avenue, London, E.C.1, for Flexible Abrasives Ltd., Fratton, Portsmouth. Precision machining of this kind, as distinct from moulding or extruding, is believed to be a new technique in this country

Patent Specifications

The following information is prepared from published Patent Specifications by permission of the Controller of H.M. Stationery Office. The full Specifications can be obtained from the Patent Office, 25 Southampton Buildings, W.C.2, at 3s. 6d. per copy (including postage).

Curing Films of Butadiene-Styrene Copolymers

No. 811,903. Esso Research and Engineering Co. Application and Filed, March 14 1957. Application in USA, March 28 1956. Published, April 15 1959.

Protective films of butadiene-styrene copolymers on metal, wood or other material are subjected to high energy ionizing radiation in order to cure the films. The treatment produces hard and glossy films without resultant discolouration. The butadiene-styrene copolymers are of the oily type containing 75-85 parts of butadiene and 25-15 parts of styrene and having a molecular weight of 3,000-10,000. Preferably the copolymers are oxidized before irradiation, such as by blowing with an oxygen-containing gas or by epoxidation. The film thickness is 0.1-3.0 mils. and the high energy ionizing radiation is preferably beta or gamma rays or a combination of these rays.

Ethylene Polymerization

No. 812,602. Imperial Chemical Industries Ltd. Inventor: L. Seed. Application, February 28 1956. Filed, December 12 1956. Published, April 29 1959.

Ethylene is polymerized under high pressure (above 500 atmospheres) and in the absence of an added liquid reaction medium to produce polymers of high density, *i.e.* greater than 0.925 gm./cc. Polymerization is effected in the presence of a chain transfer agent and a polymerization catalyst selected from the group consisting of peroxydicarbonate esters, alkyl and aryl hyponitrites, and alpha-substituted acyl peroxides. The chain transfer agent may be, for example, hydrogen, carbon tetrachloride or chloroform.

Shorter Abstracts

Tubeless Tyres. 812,396. Firestone Tire and Rubber Co. Filed, July 30 1956.—The individual cords of the fabric of the chafer of a tubeless tyre are saturated with a rubbery composition comprising essentially 100 parts of neoprene and 15-35 parts of a plasticizer compatible with neoprene.

Polymerization of Ethylene. 812,515. Société des Usines Chimiques Rhone-Poulenc. Filed, May 1 1957.—A catalyst for the polymerization of ethylene is made by heating aluminium with a halide or oxyhalide of a metal of Group 6A of the Periodic System to a temperature up to 300°C. Polymerization of ethylene with the catalyst may be effected at pressures just higher than atmospheric, but it is preferred to operate at pressures of 10-50 atmospheres.

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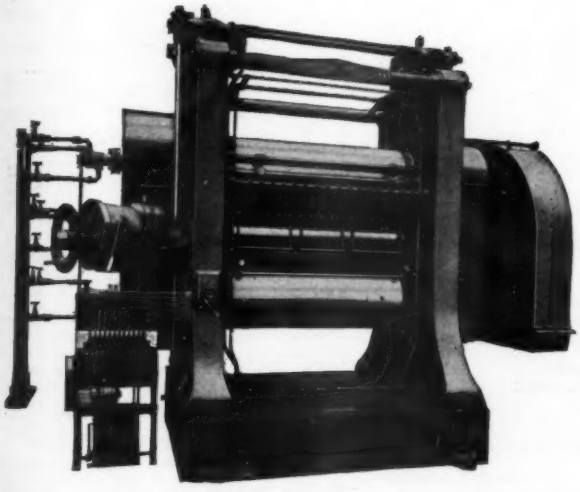

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Synthetic Rubber Prices

Prices of synthetic rubbers appear regularly in RUBBER JOURNAL AND INTERNATIONAL PLASTICS *in the first week of each month. It will be appreciated if suppliers will give notification of any price changes or additions to their range. Cif duty paid quotations are subject to slight variation due to exchange, ocean freight and insurance fluctuations. Prices are in pence per lb., except where otherwise stated.*

(e-qdp)—Ex-quay duty paid (cifUKdp)—cif UK duty paid (ddp)—Delivered duty paid (e-sUK)—Ex-store UK (ex-wUK)—Ex-warehouse UK (d)—Delivered

SBR TYPES AND HIGH-STYRENE RUBBER

Ameripol (Goodrich Gulf) (min., 70,000-lb. lots)	(e-qdp)
1000 Hot, Non-Oil	23.10
1001 " "	23.10
1002 " "	23.34
1006 " "	23.34
1007 " "	23.34
1009 " "	23.71
1011 " "	23.71
1012 " "	23.24
1013 " "	23.94
1500 Cold, Non-Oil	23.10
1501 " "	23.10
1502 " "	23.10
1703 Cold, Oil-Extended, 25% oil	*20.31
1705 " " " "	*20.07
1707 " " 37.5% oil	*18.89
1708 " " " "	*18.89
1710 " " " "	*18.66
1712 " " " "	*18.66

* Under 70,000 lb., min. 600 lb.

ASRC (American Synthetic Rubber Corpn.) (carloads lots of 30,000 lb.)	(cifUKdp*)
1000 Hot, Non-Oil	23.99
1001 " "	23.99
1004 " "	23.99
1006 " "	23.99
1009 " "	24.61
1018 " "	26.74
1019 " "	26.26
1500 Cold, Non-Oil	23.99
1502 " "	23.99
1503 " "	26.02
3110 " "	25.78
1703 Cold, Oil-Extended	20.69
1708 " "	19.27

* US/£ conversion rate $2.80

Cariflex (Shell Chemical Company)	(e-sUK)
S-1000 Hot	22.0
S-1002 "	23.375
S-1006 "	22.0
S-1009 "	24.0
S-1011 "	24.0
S-1013 "	24.0
S-1100 Hot/black	19.75
S-1500 Cold	22.0
S-1502 "	22.0
S-1509 "	22.0
S-1600 Cold/black	19.625
S-1602 " "	19.625
S-1605 " "	19.375
S-1703 Cold, Oil-Extended	20.25
S-1707 " "	17.75
S-1709 " "	17.5
S-1712 " "	17.5
S-1803 Cold, Oil/Black Masterbatch	17.875

Copo (Copolymer)	(cifUKdp)
1006 Hot, Non-Oil	23.25
1500 Cold, "	23.25
1502 " "	23.25
1505 " "	26.00
1712 " Oil-Extended	18.50
1778 " "	18.75
3900 " Rosin-Extended	23.125

FR-S (Firestone)	(cifUKdp)*
1000 Hot	23.187
1001 "	23.187
1004 "	23.187
1006 "	23.187
1500 Cold	23.187
1502 "	23.187
146 "	23.187
1703 Oil-Extended	20.125
1712 "	18.5
123 "	19.187
155 "	18.5
173 "	20.125
178 "	18.75
1009 Specialty	24.625
1010 "	25.812
1012 "	24.187
1013 "	24.875
1014 "	27.75
1015 "	28.75
141 "	28.625
158 "	29.562

*US/£ conversion rate $2.80

International Synthetic Rubber Co.	(ex-wks)
Intol 1500	22
Intol 1502	22
Intol 1710	17.5
Intol 1712	17.5

Philprene (Phillips)	(e-qdp*)
1000 Hot, Non-Pigmented	23.28
1001 " "	23.28
1006 " "	23.28
1009 " "	24.69
1010 " "	25.86
1018 " "	26.80
1019 Hot, Non-Pigmented	26.33
1100 Hot, Pigmented	19.65
1104 " "	19.28
1500 Cold, Non-Pigmented	23.28
1502 " "	23.28
1503 " "	26.10
1601 Cold, Pigmented	19.56
1605 " "	19.28
1703 Cold, Oil-Extended	20.23
1706 " "	19.94
1708 " "	18.82
1712 " "	18.58
1803 " Pigmntd, Oil-Extended	17.78
1805 " " "	15.99

*US/£ conversion rate $2.81½

Plioflex (Goodyear)	(fasUSport US Cents per lb.)
1006 Hot, Non-Pigmented	23.25
1500 Cold, Non-Pigmented	23.25
1502 " "	23.25
1703 Cold, Oil-Extended	20.00
1710 " "	18.25
1712 " "	18.25
1713 " "	16.9
1714 " "	16.65
1773 Cold, Oil-Extended, Light-Coloured	20.00
1778 Cold, Oil-Extended, Light-Coloured	18.5

Polysar (Polymer UK)	(e-sUK)
Krylene NS Cold Non-Staining	22

Synpol (Texas-U.S. Chemical Company)	(cifUKdp)
1000 Hot, Non-Oil	23.10
1001 " "	23.10
1002 " "	23.34
1006 " "	23.20
1007 " "	23.20
1009 " "	23.71
1012 " "	23.24
1061 " "	23.10
X-274	25.32
8000	23.94
1500 Cold, Non-Oil	23.10
1502 " "	23.10
1551 " "	23.10
1703 Cold, Oil-Extended	20.13
1707 " "	18.71
1708 " "	18.71
1711 " "	18.62
1712 " "	18.48
8200 " "	18.71
8201 " "	17.20
8150 Cold, Black Masterbatch	19.46
8253 Cold, Oil and Black Masterbatch	16.20
8254 Cold, Oil and Black Masterbatch	15.83
8256 Cold, Oil and Black Masterbatch	16.33

US/£ conversion rate $2.80

SBR LATICES

Copo (Copolymer) (10-ton lots)	(cifUKdp)
2101 (dry weight)	46.30
X-765 (" ")	40.80
X-800 (" ")	37.20
2102 (" ")	38.00
2105 (" ")	38.00
2110 (" ")	38.00

Naugatex (Naugatuck Chemical International)	(ex-wUK)
2000	39
2001	39
2002	39.5
2006	43
2105	40
2107	40
2108	40
2711	39
2714	39
2733	39
2740	43

Pliolite Rubber (Goodyear)	(d)
2000	40

Latex	
2001 (dry weight)	40
2104 " "	40
2105 " "	40
2108 " "	40
5350 " "	40

Pliolite Resin (Goodyear)	(d)
101A (dry weight)	44
150 (" ")	50
151 (" ")	35
160 (" ")	50
170 (" ")	50

Hycar (B. F. Goodrich)	(ddp)
2507 (high styrene) dry weight	48

Polysar (Polymer UK)	(e-sUK)
Latex, type IV	32.5
Latex, type 721	31.75

International Synthetic Rubber Co.	(ex-wks)
Intol Latex R23	22
Intol Latex M23	22

ACRYLONITRILE TYPES

Butaprene N (Firestone)	(cifUKdp)
NL	52.5
NAA	56.25
NF	51.5
NXM	60.18

Chemigum	(e-s)
N—1	75
N—3A	52
N—5	52
N—6G	45
N—7	45
N—8	45
N600X	45

Hycar (British Geon) (500-lb. lots and over)	(UKd)
1001 High Nitrile Hot	52
1041 " " Cold	52
1002 Medium High Nitrile Hot	45
1042 " " " Cold	45

Hycar (B. F. Goodrich) (500-lb. lots and over)	(ddp)
1411 High Nitrile (powder)	66
1432 Medium High Nitrile (crumb)	64
1072 Medium High Nitrile (carboxyl)	66
1312 Medium High Nitrile (liquid)	55
1043 Medium Low Nitrile	51
1014 Low Nitrile	61
I.C.I. (min. 5-cwt. lots)	(UKd)
Butakon A-4051 High Nitrile Cold	52
Butakon A-3051 Medium Nitrile High Mooney Cold	45
Butakon A-3002 Medium Nitrile Low Mooney Cold	45
Paracril (US Rubber)	(e-sUK)
18-80 Low Nitrile	63
AJ " "	50
B Medium Low Nitrile	51
BJ " " "	51
BLT " " " Cold	51
BJLT " " " "	51
C Medium High Nitrile	59
CLT " " " Cold	59
CV " " "(crumb)	60
D High Nitrile	67
ALT	51
Polysar (Polymer UK)	(d)
Krynac 800 Medium Nitrile	45
Krynac 802 Low "	45
Krynac 803 Medium " (low Mooney)	45
Krynac 801 High Nitrile	52

ACRYLONITRILE LATICES

Butaprene N (Firestone)	(cifUKdp)
N-300 (dry weight)	53
N-400 (" ")	60.5
Chemigum Latex (Goodyear)	(d)
200 (dry weight)	65
235 CHS (" ")	60
236 (" ")	60
245 B (" ")	52
245 CHS (" ")	52
246 (" ")	52
247 (" ")	52
248 (" ")	52
Hycar (B. F. Goodrich) (dry weight, 3 drums and over)	(ddp)
1551 High Nitrile (large particle)	66
1552 Medium High Nitrile (large particle)	57
Hycar (British Geon) (dry weight, 3 drums and over)	(UKd)
1561 High Nitrile	60
1571 " " (carboxyl)	60
1562 Medium High Nitrile	52
1577 " " " (modified)	

ACRYLIC TYPES

Hycar (B. F. Goodrich)	(ddp)
4021 Slab, 500 lb. and over	144
4501 Latex, dry weight	96

BUTYL TYPES

Esso	(e-sUK)
Regular 035	21.75
Regular 150	21.75
Regular 215	21.75
Regular 217	21.75
Regular 218	21.75
Regular 325	21.75
Non-staining 065	22.75
Non-staining 165	22.75
Non-staining 265	22.75
Non-staining 267	22.75
Non-staining 268	22.75
Non-staining 365	22.75
Vistanex (Polyisobutylene)	(e-qdp)
MS Low molecular weight	54
MH " " "	54
L-80 Medium molecular weight	54
L-100 " " "	54
L-120 " " "	54
L-140 " " "	54

Polysar (Polymer UK)	(e-sUK)
Butyl 100	21.75
Butyl 200	21.75
Butyl 300	21.75
Butyl 301 (non-staining)	21.75
Butyl 400	21.75
Butyl 101 (non-staining)	26.25
Butyl 402	22.5
Hycar (B. F. Goodrich) (500 lb. and over)	(ddp)
2202 Brominated	68

NEOPRENES

	(e-qdp)
W and WHV (dry weight del)	42.62
WRT (" " ")	48.37
WX (" " ")	44.62
GN (" " ")	44.62
GNA (" " ")	44.62
GRT and S (" " ")	45.62
AC (" " ")	57.125
KNR (" " ")	75.62
AC'M'and'S' (" " ")	57.125
CG (" " ")	57.125
AD (" " ")	57.125

Latices—Dry (per lb. del, min. 50 lb.)	
571	49.75
842A	49.75
572	51.25
601A	51.87
650	54.125
735	51.25
736	51.25
950	58.25
60	51.87
750	51.25
635	53.62

SILASTOMER

Midland Silicones (500 lb. lots del)	
Stocks	16s. 6d. to 35s.
Pastes	26s. to 35s.
Gums and base stock	36s. to 42s.
Cold-curing silicone rubber	20s. and 23s. 6d.

REINFORCING RESINS AND RUBBERS

I.C.I. (min. 2-ton lots)	(UKd)
Butakon S-8551	36.5
Butakon S-7001	33.5
Hycar (B. F. Goodrich)	(ddp)
2007 (powder)	42.5
Pliolite (Goodyear)	(d)
S—6B	36.5
Polysar (Polymer UK)	(e-sUK)
SS-250 (high styrene) (bale form)	27.25
SS-250 (" ") (flake form)	27.5
Kryflex 252 (high styrene)	25.5
Cyclite (Durham Raw Materials)	42

HYPALON

In 50-lb. bags del UK	71.62

Rubber Consumption in US

The US Rubber Manufacturers Association reports that total consumption of new rubber in August amounted to 137,076 tons against 141,279 (revised) in July. This comprised 46,840 tons of natural and 90,236 tons of synthetic. July consumption comprised 47,545 tons of natural and 93,734 tons of synthetic. Total synthetic rubber production in August was 119,031 tons against 114,316 (revised) in July, while production of GR-S only was 97,115 against 94,799 (revised) in July.

Rubber Crop Returns

Unless otherwise indicated the figures quoted, to the nearest thousand lb., represent crop returns for the month stated and for the number of months of the planting company's financial year to date. Corresponding figures are given in parentheses.

HARRISONS AND CROSFIELD

Sumatran Companies—August

Allied Sumatra.—827 (823). 8 mths—5,796 (6,011).
Asahan.—99 (115). 1 mth—99 (115).
Bah Lias.—145 (181). 10 mths—1,484 (1,958).*
Central Sumatra.—69 (88). 2 mths—113† (181).
Lankat Rubber.—67 (66). 5 mths—289 (297).
Mendaris.—198 (216). 8 mths—1,391‡ (1,512).
Namoe Tongan.—263 (238). 12 mths—2,876§ (3,180).
Sialang.—205 (209). 7 mths—1,313 (1,261).
Soengei Rampah.—57 (50). 8 mths—409 (389).
Tanah Datar.—71 (83). 8 mths—53 (596).
Tandjong.—150 (146). 2 mths—300 (315).
Toerangie.—211 (220). 10 mths—(1,922 (2,114).
United Lankat.—28 (33). 8 mths—217 (241).
United Serdang.—845 (1,012). 12 mths—10,164 (11,689).

* Previous year's crop includes 235,985 lb. from Sungei Brohol division (sold June, 1958).

† Production was interrupted during July as a result of an attack by an armed band.

‡ Includes 253,904 lb. destroyed during a raid on February 27, 1959.

§ The larger of the company's two estates was out of production during March following an attack by an armed band.

Malaya/Borneo—August

Castlefield.—270 (214). 2 mths—552 (456).
Golden Hope.*—756 (647). 6 mths—4,230 (3,628).
Holyrood.—87 (70). 8 mths—570 (504).
Hongkong.—28 (22). 8 mths—216 (157).
Hoscote.—239 (220). 2 mths—490 (453).
Killinghall.—46 (39). 2 mths—91 (79).
Kuala Selangor.—72 (57). 8 mths—505 (397).
Kulai.—183 (171). 10 mths—1,985 (1,531).
Lanadron.—521 (432). 8 mths—3,384 (3,018).
London Asiatic.—1,605 (1,562). 8 mths—11,653 (10,771).
Malaysia.—52 (59). 8 mths—412 (449).
New Crocodile.—252 (251). 6 mths—1,389 (1,391).
Pataling.—1,360 (1,132). 10 mths—11,971 (9,782).
Prang Besar.†—270 (180). 5 mths—1,261 (868).
Sandac.—90 (75). 5 mths—386 (344).
Sapong.—167 (148). 8 mths—1,174 (1,050).
Seaport.—75 (80). 2 mths—140 (160).
Strathisla.‡—116 (102). 14 mths—1,496 (1,282).

* Klanang Bahru Estate crop included from January 1, 1959.

† Bukit Prang Estate crop included from January 1, 1959.

‡ Current financial period covers 16 months ending October 31, 1959.

Rubber and Plastics Stock Market

A REVIEW OF PRICES AND TRENDS

THE London stock market is now completely in the grip of the election. Buying of top grade 'blue chips' has now virtually dried up and there is a dribble of sales for the more speculative political issues like steel shares.

The position will probably worsen as the election date draws nearer and the public opinion polls follow their traditional line and show an ever narrowing gap between the two main contestants.

In the main the shares of the plastics and rubber manufacturing companies have displayed a reasonably firm pattern with a few features scattered in the list.

RFD ordinary shares which from time to time spurt to life on take-over whispers were marked down to 5s. 2½d. This move was probably more associated with the general market trend than with the news that the company itself is doing a take-over deal. RFD directors have announced that they have acquired the PERSEVERANCE MILL group for an issue of 1,000,000 RFD 2s. ordinary shares. The Perseverance group has for years been the main supplier to RFD of the fabric used in its main products. The acquisition is to ensure continuance of supply.

The plant and buildings of Perseverance are valued in the books at around £66,700 but it is pointed out that they have been recently revalued at a figure substantially higher. Net assets amount to £462,000 and the directors estimate that profits should not be lower than the previous year's consolidated figure of £27,000 before tax.

From ARUSHA INDUSTRIES came news that it had now secured 80% control of the WEBLEY AND SCOTT group which takes in R. H. WINDSOR. The offer is now being further extended to give the lagging shareholders another chance of changing their minds.

One of the most successful companies from the investment point of view has been the MARLEY TILE group. The latest profit figures show that shareholders have good reason to hope for yet another dividend rise in the ensuing year.

In the three months ending July last the profit rose from £446,000 to £543,000. This brings the nine months' total up to £1,458,000 against £1,137,000.

The net figure for the three month period comes out at £182,000 (£159,000) and for the nine month period at £498,000 (£336,000).

REDFERN HOLDINGS ordinary were marked lower despite the statement issued by the directors to the effect that trading in the current year so far was showing an improvement on 1958. The directors added that they preferred to await the full results of the year before making any decision on dividends.

As expected the interim results from the giant IMPERIAL CHEMICAL concern were exceptionally buoyant. The interim dividend is lifted from 2¾% to 3¾%, and the net income rises by no less than £6,640,000 to £20,230,000. It would appear that sales of this massive concern have a good chance of going over the £500 million mark in the current year. Sales for the first half of the year total some £250 million against £232,000,000

Continued on page 309

Share Price Movements

Par Value	Company	1958-59 High	Low	Sept. 19	Latest
5/-	Albright & W. Ord. ..	24/1½	13/4½	29/9	23/9‡
£1	„ „ „ 5% Pref...	16/7½	15/4½	16/3	16/3
5/-	Anchor Chemical Ord...	15/6	10/3	14/4½	15/6
5/-	Andersons Rub. Ord. ..	4/3¾	3/-	3/2¼	3/2¼
2/-	Anglo-Amer. Vulc. Fibre Ord.	4/3	2/-	3/7½	3/9
£1	Angus Geo. Ord. ..	29/10½	21/-	28/3	28/-
5/-	Ault & Wiborg Ord. ..	4/10½	2/3	4/6¾	4/6¾
£1	Avon India Rubber Ord.	23/-	11/9	21/9	21/6
£1	„ „ „ 6% Pref.	42/6	27/-	40/-	38/6
10/-	Bakelite Ord.	18/6	17/3	17/9	17/6
£1	„ 6% Pref. ..	30/9	17/-	30/7½	29/10½
£1	Baker Perkins Ord. ..	19/6	18/3	18/3	18/1½
4/-	Bank Bdg. Rubber Ord.	47/9	30/7½	44/3	45/9
5/-	Boake (A.) Roberts Ord.	2/8½	1/6	2/8½	2/7½
£1	„ „ „ 5% Pref.	18/6	9/-	16/4½	18/-
4/-	Brammer H. Ord. ..	15/1½	13/9	13/9	13/9
5/-	Bridge, David Ord. ..	14/9	9/6	14/8½	13/7½
5/-	Bright, John Ord. ..	32/-	16/3	32/-	31/6
2/-	Brit. Ind. Plas. Ord. ..	15/-	8/9	13/6	14/3
2/-	„ 10% (tax free) Pref.	8/6	4/9	8/4½	8/-
£1	British Xylonite Ord. ..	5/9	4/7½	4/7½	4/7½
£1	„ „ 5% Pref.	61/3	28/6	61/-	59/-
5/-	BTR Ind. Ord.	15/9	14/-	15/9	15/9
£1	„ „ 7½% Pref. ..	13/3	8/1½	8/11¼	8/4½
£1	Courtaulds Ord... ..	22/9	20/9	22/9	22/9
£1	„ 5% 1st Pref.	41/9	20/-	41/4½	40/1½
£1	„ 6% 2nd Pref.	18/6¾	15/7½	17/6	17/3
4/-	Cow, P. B. Ord. ..	20/3	17/1½	20/3	21/1½
£1	„ 5% Pref. ..	7/3	3/6	7/2½	7/-
5/-	Dale, John Ord... ..	14/3	10/9	14/3	14/-
£1	„ „ 6% Pref. ..	17/1½	10/-	13/6	16/9
1/-	Dannimac Mfg. Ord. ..	16/-	13/-	15/10½	16/-
10/-	De La Rue Ord. ..	8/9	2/6	8/7½	7/6
£1	„ „ „ 3½% Pref. ..	54/-	42/9	50/6	47/-
6/8	Distillers Co. Ord. ..	11/9	10/-	10/9	10/6
£1	„ „ 6% Pref...	28/9	15/9	28/6	28/1½
£100	„ 5% Conv. Loan	21/7½	19/10½	21/6	21/-
£100	„ 5½% Unsec. Loan	£96½	£91	£94½	£94
10/-	Dunlop Rubber Ord. ..	£95	£87 7/6	£93¾	£92¼*
£1	„ 5½% Pref.	25/6	14/9	25/4½	24/9
£100	„ 3½%1st Debs.	19/-	15/10	18/6	18/1½
£100	„ 4½% 2nd Debs.	£75½	£67¾	£75¼	£74¾
4/-	Ebonite Cont. Ord. ..	£84	£78	£84½	£83¾
£1	English China Clays Ord.	15/3	7/6	12/-	11/1½
£1	Goodyear Tyre 4% Pref.	66/-	29/9	65/9	65/-

Par Value	Company	1958-59 High	Low	Sept. 19	Latest
5/-	Greeff Chem. Ord. ..	12/9	12/-	12/6]	12/1½
10/-	„ „ 5½% Pref...	28/-	14/-	25/-	26/9
4/-	Greengate & Irwell Ord.	8/3½	7/9	8/1½	8/3
£1	Harrisons & Crosfield Dd.	7/0¾	4/4½	4/9	4/7½
1/-	Hunt & Moscrop Ord. ..	64/3	43/9	64/-	65/7½
£1	Imp. Chem. Ord. ..	1/8½	1/1½	1/8½	1/6¾
£1	„ „ 5% Pref. ..	46/4½	28/3	42/6	45/3
£100	„ 4½% Unsec. Loan	17/9	16/-	17/6	16/10½
£100	„ 5½% Conv. Loan	£88½	£80	£88½	£86
1/-	Kleemann (O. & M.) Ord.	£143	£99	£131	£142½
1/-	„ „ New Ord.	6/-	2/6	5/10½	5/7½§
£1	„ „ 6½% Pref.	16/9	15/-	16/9	16/7½
2/-	Lacrinoid Prod. Ord. ..	2/5½	1/5¾	2/3¾	2/3
5/-	Laporte Ind. Ord. ..	27/6	13/7½	23/9	22/1½
£1	„ „ 7½% Pref.	22/10½	21/10½	22/6	22/6
£1	Leyland & Birm. Rubber Ord.	58/9	39/9	56/-	48/-
£1	„ „ 6% Pref.	21/3	16/1½	17/-	17/-
2/-	London Rubber ..	11/1½	6/3	11/-‡	10/6
£1	„ 6% Red. Cum. Pref.	19/9	16/3	18/9	18/9
£1	McKechnie Bros. Ord.	46/-	23/6	43/-	46/-
£1	„ „ 'A' Ord.	44/6	30/-	42/-	43/-
£1	„ „ 6% Cum. Pref.	17/-	16/-	16/6	16/9
5/-	Monsanto Chem. Ord. ..	19/6	13/-	19/6	19/-
£1	„ „ 3¾% Pref.	13/-	11/-	13/-	13/-
£100	„ 6% Debs.	£104	£101½	£103½	£103½
£1	North British Rubber ..	—	—	16/-	16/-
5/-	Redfern Holdings Ord...	5/2½	2/10½	4/7½	4/6¾
2/-	RFD Ltd. Ord.	6/6	3/5½	5/6¾	5/2½
£1	„ „ 5½% Pref. ..	14/9	11/6	14/9	14/1½
2/-	Rubber Imp. Ord. ..	15/6	4/9	5/10½	6/-
2/-	„ „ 'A' Ord.	14/3	4/6	5/0¾	5/-
£1	„ 5% 1st Pref.	12/3	10/-	10/-	10/-
5/-	Rubber Reg. Ord. ..	13/-	10/6	12/9¾	12/6
4/-	Shaw Francis Ord. ..	16/4½	9/9	16/4½	16/3*
2/-	Silentbloc Ord. ..	9/-	7/6	10/2½	8/3§
2/-	Sussex Rubber Ord. ..	1/11½	7½	1/10½	1/11½
5/-	Sutcliffe Speak Ord. ..	8/10½	5/-	8/-	8/3
£1	Turner & Newall Ord. ..	81/6	52/-	77/1½	80/9
£1	„ „ 7% Pref.	25/-	22/1½	25/-	24/-
5/-	Universal Asbestos Ord.	26/10½	8/0¾	26/9	22/6*
5/-	Viscose Dev. Ord. ..	13/9	6/3	11/6	11/6
5/-	Warne William (Holdgs.) Ord.)	14/-	8/-	13/10½	13/10½

*Ex-dividend †Ex-all ‡Ex-bonus §Ex-rights

Rubber Markets

LONDON

The decision by the US and UK stockpiles to release rubber has again been the main talking point in the London rubber market during the past week. The market has, of course, been extremely sensitive and most of the business has been in the nearby positions but there has been a further hardening in the more distant positions. At one time the squeeze in the spot position pushed the price up to within threefarthings of 3s., but there has been a considerable reaction since, although there is still a gain of a ¼d. on the week. The Continent has taken an active interest at times.

Latest prices are as follows:

No. 1 RSS Spot: 34d. nominal.

Settlement House:
November 30⅝d.-30⅞d.
December 29⅜d.-29⅝d.
January/March 28¾d.-29d.
April/June 28⅛d.-28⅜d.
July/September 27¾d.-28d.
October/December 27⅛d.-27⅜d.

No. 1 RSS cif basis ports:
October 29⅝d.-29⅞d.
November 29⅛d.-29⅜d.

Godown:
October 102¼ Straits cents nominal.

LATEX

Centrifuged latex per gallon in drums, December shipments, 18s. 3d. seller, cif European ports. Spot, 19s. 9d. nominal. Bulk, 18s. 2d. nominal. December delivery, nominal. Creamed, seller, 17s. 10d. November. Normal, seller, 14s. 3d. September/October.

AMSTERDAM

The Amsterdam rubber market ruled as follows on September 28:

	Guilders per kilo	
No. 1 RMA	Sept 28	Previous
September	3.00	3.00
October	2.95	2.95
November	2.95	2.95
December	2.95	2.95
October/December ..	2.95	2.95
January	2.75	2.75

Sales: 30. Tendency: Quiet.

CEYLON

Market closed.

SINGAPORE

The market opened slightly higher and steadied further in quiet trading on September 28. The announcement by Indonesia's New Estate Bureau that it would in future be exporting direct to overseas consumers (reported in this issue) caused some local covering. Lower sheet interest was small and sellers being reserved, business in this section was slow. The market advanced during the afternoon but very little business was reported. The main interest was in October No. 1 RSS. November No. 1 RSS passed at two cents discount. Sellers of physicals were reserved but buying interest was selective and limited. The market improved further during unofficial hours on some trade buying and finished the day on a quiet but steady note.

	Straits cents per lb., fob Malayan ports to open ports	
	Close	Prev. Close
No. 1 RSS, Oct.	101½–101¾	100 –100⅛
Nov.	99⅛– 99¾	98 – 98½
No. 2 RSS, Oct.	100⅜–101¼	99⅛– 99⅜
No. 3 RSS, Oct.	99⅜–100⅛	98⅛– 99
No. 4 RSS, Oct.	99 – 99¾	97⅛– 98¼
No. 5 RSS, Oct.	97⅛– 98¼	95⅜– 96⅛
No. 1 RSS, Spot	103⅜–104¼	102⅛–103¼
No. 3 blanket, thick remilled, Oct.	98½–100½	97⅛– 99⅛
Int. No. 1 fine pale crepe, Oct.	113½–115½	113 –115
2X thin brown crepe, Oct. ..	97⅜– 98¾	96⅛– 97¼

Tendency: Steady.

The Industries Syndicate quote latex, native produce, 60% centrifugal, packed in rec. drums fob at 200.20d. per gallon.

BANGKOK

No. 1 RSS

The price for No. 1 RSS, at Bangkok on September 14 was 32.50 (32.50) US cents per lb.

NEW YORK

The New York rubber market ruled as follows on September 28:

DEALERS' PRICES

	Ex-dock, US cents per lb.	
	Sept. 28	Previous
No. 1 RSS, Oct.	37¼n	37⅛n
Nov.	36⅜b–36⅝a	35⅞b–36⅛a
No. 2 RSS, Oct.	37⅛n	37n
Nov.	36⅛b–36⅜a	35⅝b–35⅞a
No. 3 RSS, Oct.	37n	36⅞n
Nov.	35⅞b–36⅛a	35⅝b–35⅞a
No. 1 RSS, Spot	43n	40½b–42a
No. 3 amber blanket crepe, Dec.	34½b–35a	34⅛b–34⅜a
No. 1 latex, thin crepe, Oct. ..	39n	39n
No. 1 latex, thick crepe, Oct. ..	40n	40n

FUTURES—REX CONTRACT

	US cents per lb.	
	Close	Prev. Close
Sept. ..	45.00n	44.00t
Nov. ..	36.50b–36.60a	35.75b–35.85a
Jan. ..	34.40t	33.85t
March ..	33.77b–33.90a	33.40t
May ..	33.40b–33.55a	32.90b–33.15a
July ..	33.05b–33.30a	32.55b–32.80a
Sept. ..	32.75b–33.00a	32.25b–32.50a

Sales: 37. Tendency: Firm.

Rubber futures were firmer on covering in a light trading volume on September 28. Traders said higher foreign markets and fair interest by factories in physicals aided the market. Factories were buying November and December landed positions. Shipment offerings were on a moderate scale and rather high priced. In late trading, futures were firm on light covering and buying in a thin market.

SYNTHETIC RUBBER

The following prices ruled in New York on October 1:

	(cents per lb.)	
	Oct. 1	Prev.
GR-S, fas New Orleans ..	23.25	23.25
Neoprene GN, fob Louisville	41	41
Neoprene W, fob Louisville	39	39
Butyl, fas New Orleans ..	23	23
Paracril, fob Baton Rouge	50	50

DJAKARTA

Market closed.

STOCK MARKET

Continued from page 308

for the same period last year when the year's total sales were £463,000,000.

Imperial Chemical ordinary shares were a strong market following the news rising to a new peak of 46s. 4½d. There can be little doubt that the price is still influenced more than most of the industrial leaders by the nearness and uncertainty of the election.

The order book of the SILENTBLOC concern is now at a higher level than at this time last year and the board looks forward to the future with some confidence. Shareholders have already participated in a 'rights' issue of shares on the basis of one-for-six at 3s. In the year to May 31 last the net profit was nearly £150,000 against £134,000, and the dividend on the ordinary was held at 25%. Competition during the year reduced profit margins on existing products but the introduction of new items more than made up the profits lost.

The VULCANITE concern is to make a bonus issue in preference and ordinary share on a one-for-one basis.

Rumours which were circulating the market concerning a merger between DE LA RUE and WADDINGTON were firmly denied by the chairmen of both companies.

Polypenco Ltd.

Polypenco Ltd., the Welwyn Garden City manufacturers of engineering industrial plastics, have recently appointed two new agents, one in Manchester to handle their business in the North West of England, including Lancashire, Cheshire, Cumberland and North Wales, and one in Glasgow to handle Polypenco business North of the Border. The agents appointed are: North West England—The Norman Wrigley Co. Ltd., 366 Stretford Road, Manchester 15. Scotland—Durward Clarkson and Co. Ltd., 137a St. Vincent Street, Glasgow C.2.

Industry INTELLIGENCE

Technical Data

Water Absorption and Water Vapour Transmission of Polyurethane Rigid Foams

For many applications of rigid foam, including its use for thermal insulation, it is important that the foam has a high resistance to both absorption of water and permeability to water vapour. Data for both these properties for certain Daltolac/Suprasec foams are given in Technical Information—Urethane PC/U.5, issued by the Polymer and Chemicals Service Dept., Dyestuffs Division, I.C.I.

Water absorption is measured by preparing blocks of the rigid foam, 6in. x 6in. x 6in., without skins, and immersing them in water to an overall depth of at least 6in. The blocks are weighed periodically until the increase in weight reaches an equilibrium value. The results indicate that the maximum quantity of water that can be absorbed is equal to the volume of open cells within the foam, so that foams based on Daltolac 22/Suprasec D and Daltolac 24/Suprasec D, which have an open-cell content of about 40–60%, can absorb a quantity of water equivalent to 40–60% of their own volume. On the other hand, Daltolac 41/Suprasec D based foams, sprayed and machine dispensed, have a completely closed-cell structure, and the water absorption is therefore extremely low (of the order of 1% or less).

The water vapour transmission of the Daltolac 41/Suprasec D foam was also much lower than that of the other two types of foam. The method of measuring the water vapour transmission is described and it is mentioned that improved resistance to water vapour is imparted by skins on the surface of the foam or at the interfaces between layers. In practice, when foaming *in situ* takes place, a continuous wall of foam is produced that fills moulds of any shape or size. The presence of skins and the absence of gaps and junctions in the foam give the best conditions for utilizing fully the inherent water vapour resistance of the material. The containing walls add to this resistance, and in instances where the walls are constructed of metal sheet, as in ships' bulkheads, complete protection against the ingress of water vapour is obtained.

Foam Control Agent

Siotol NC is a new anti-foaming agent of particular value for controlling foam in paper-coating processes. In normal casein-bound coatings and in the application of coatings based on synthetic polymer latices, for example, 'Butakon' types, Siotol NC is said to be markedly superior to other anti-foaming agents.

Siotol NC is a white paste that is readily diluted with soft water or mill condensate to form emulsions. The quantity to use is best determined by local conditions, but for casein-based coatings will generally be between 10 and 40 parts per million of coating mix. For coatings containing synthetic polymer latices 50-100 parts per million of coating mix may be necessary.

Details on the properties and use of Siotol NC are given in Auxiliary Products Pamphlet No. 111, issued by the makers, the Dyestuffs Division of Imperial Chemical Industries Ltd.

Machines, Materials and Equipment

Anti-Static Air Gun

Certain materials, particularly plastics, tend to hold dust particles by electrostatic attraction. Attempts to remove the dust by wiping may increase the static charge and make matters worse. An air gun has been developed which blows ionized air and this simultaneously blows away the dust and neutralizes the charge on the surface, so preventing re-attraction of dust. The gun is similar in appearance and method of use to a normal lightweight air gun. It needs a compressed air supply at 15 to 50lb. per sq. in., and is also fed with high voltage from a small power pack, one of which will supply several guns. The gun is supplied under the trade name 'Neutrostat' by Sheridan Croxted Ltd., 296/302 High Holborn, London, W.C.2.

Bin Cleaner for Small Components

Components kept in open bins or trays in workshops and stores collect dust and dirt. This is a particular nuisance in the case of very small items such as nuts and washers, and an ingenious tool has been introduced to overcome it. The tool consists of a small attachment intended for use with a standard industrial suction cleaner. The tool is attached to the suction hose of the cleaner and held near the components in the bin; suction draws them into it and holds them in a state of gentle agitation whilst the dirt is removed. Thumb pressure on the trigger releases the suction, and the cleaned components can be dropped into their container. The device is made by the Martindale Electric Co. Ltd., Westmorland Road, London, N.W.9.

Publications Received

Plastics in Packaging

The first number of a new publication — 'Plastics in Packaging' — has just been issued by Bakelite Ltd. Subsequent numbers are to be published at regular intervals.

In an attractive eight-page octavo format, the magazine is made up of photographs illustrating the wide variety of packs and containers based on Bakelite materials. Featured in the first issue are: Polythene bottles and containers, reinforced polyester resin boxes and water holders, high-clarity polythene film for garment and textile packaging, and polythene film and laminated films in food packaging. Copies are available, free, from Bakelite Ltd., 12 Grosvenor Gardens, London, S.W.1.

Plastics in the Chemical Industry

The increasing use of synthetic resins and plastics in the chemical industry is described in a new illustrated publication issued by the Distillers Plastics Group.

The booklet illustrates a wide range of applications of plastics materials in the construction of many types of chemical plant and in the manufacture of protective clothing and as packaging materials for chemical products. The special properties possessed by the different types of plastics materials are also indicated. Copies of the publication, 'Synthetic Resins and Plastics in the Chemical Industry' are available free of charge from Information Department, Distillers Plastics Group, Devonshire House, Piccadilly, London, W.1.

Laboratory Coating Machines

The comprehensive range of laboratory coating machines manufactured by T. H. Dixon and Co. Ltd., Works Road, Letchworth, Herts., for every aspect of research and technical development connected with all types of coatings, impregnations and two and three-ply laminations of paper, film, plastics, fabrics, etc., is explained in a pamphlet recently issued by the company. Diagrams and photographs show how the company's processes are applied. Standard machines cover a speed range of from 2ft. per minute to 225ft. per minute.

Future Events

INSTITUTION OF THE RUBBER INDUSTRY

The Autumn Conference of the IRI will be held at the Palace Hotel, Southport, on October 9 and 10. The theme of the conference, a preview of which appeared in *RJIP* of August 29, will be 'Industrial Technical Organization.'

Burton-on-Trent Section.—Monday October 5 at the Midland Hotel, Burton-on-Trent at 7.30 p.m. 'Polyether-Based Urethane Foams,' by Mr E. A. Packer, B.Sc., and Dr J. F. Wood (I.C.I. Ltd.).

London Section.—Tuesday October 6 at the Café Royal, Regent Street, London, at 6 p.m. 'The Production and Properties of Faster-Curing Butyl Rubber,' by Mr Z. J. Dorko, Mr D. C. Edwards and Dr P. B. Lumb. The paper will be read by Dr Lumb, of the Polymer Corp. Ltd., Sarnia, Canada.

Midland Section.—Monday October 12 in the Council Chamber, Fort Dunlop, Birmingham, 24, at 6.45 p.m. 'Rubber in Civil Engineering' (with film) by Dr A. N. Gent (BRPRA).

North-Eastern Section. — Monday October 5 at the Eldon Grill, Grey Street, Newcastle, at 7 p.m. 'Liquid Rubbers,' by Mr C. Speight, B.Sc., A.R.I.C. (United Ebonite and Lorival Ltd.).

Preston Section.—Monday October 12 at the BTR Industries Social Club, Farington, Preston, at 7.15 p.m. 'Silicones in Industry,' by Mr R. W. Douglas (Midland Silicones Ltd.).

South Wales and Monmouthshire Section. — Monday October 5 at the Royal Hotel, Cardiff, at 7.30 p.m. 'Moulding Mechanicals,' by Mr J. W. Mann, A.I.R.I. (Jos. Lucas (Electrical) Ltd.).

PLASTICS INSTITUTE

The Plastics Institute President's Reception and Conversazione will be held in the Members' and Strangers' Dining Rooms at the House of Commons on Friday October 9 at 7.30 for 8 p.m.

London and District Section. — Tuesday October 6 at the Wellcome Building, 183-193 Euston Road, London, N.W.1. at 6.30 p.m. 'Design in Plastics' by M. O. Rowlands, M.S.I.A., Ekco Plastics Ltd.

Midlands Section.—Monday October 5 at the Grand Hotel, Leicester, at 6.45 p.m. 'Plastics in the Cosmetics and Pharmaceutical Industries,' by K. Eley, Boots Pure Drug Co. Ltd.

Plastics and Polymer Group, Society of Chemical Industry.—Monday October 5 at the SCI Meeting Room, 14 Belgrave Square, London, S.W.1. 'The Polymerization of Olefines Using Organo-metallic Catalysts,' by Sir Robert Robinson. Joint meeting with the London Section, Society of Chemical Industry.

Plastics and Polymer Group, Society of Chemical Industry. — Wednesday October 7 at the King's Head Hotel, Newport, Monmouthshire, at 7 p.m. 'Hydrocarbon Polymers,' by Professor C. E. H. Bawn. Joint meeting with the South Wales Section of the Society of Chemical Industry.

Southern Section. — Thursday October 8 at the Chemistry Department, The University, Southampton, at 7.30 p.m. 'Plastics in Packaging,' by C. H. Bulmer, M.A., Printing, Packaging and Allied Trades Research Association.

Western Section.—Wednesday October 21 at Gloucester Technical College at 7 p.m. 'Polyurethane Foams,' by Dr J. F. Wood and Mr E. A. Packer.

EXHIBITIONS

The International Scientific Research Exhibition will be held at Olympia, London, from October 3-10.

The Dusseldorf Plastics Exhibition opens on October 17 to run until October 25.

IRI Golfing Society

LONDON SECTION MEETING

THE London Section Sorbo Bowl meeting was this year held at the Berkshire Golf Club on September 18. Thirty members and guests were present and once again we were thoroughly impressed with both the course and the amenities. In spite of the dry summer, fairways and greens were in excellent condition, although many members complained of the lack of width of the former which made excursions into the heather, bracken and trees a rather common occurrence. It was therefore no wonder that the low handicap members carried everything before them, but even the rabbits agreed that they had had a most enjoyable day.

The morning Stableford Competition for the Sorbo Bowl and accompanying prizes resulted in a win for Don Langrish-Smith with 37 points. He was followed by his brother Ken with 36 and Eric Pilbrow with 33. The visitors' prize was carried off by L. G. Randall with 37 points and second was W. F. Drury with 33.

In the afternoon there was a fourball better-ball Stableford which resulted in a tie between the Alf Padgham/Randall and McQueen/Garth Swann partnerships. The former, being one point better on the last nine, were declared the winners.

Alf Padgham, as usual, gave an impeccable performance in the morning with a five under par score of 69 and carried off the professionals' prize without competition.

Thanks of the Section are due to Messrs. Garner, Urban and Finnie for the prizes, which were much appreciated. Alf Padgham walked off with a tankard and a bottle of whisky, but it is gathered that he has as yet no intention of spoiling his game by increasing the size of his nips.—J.F.E.R.

TRADE MARKS

Objections to the registration of any of the undermentioned applications may be lodged with the Comptroller-General of Patents, Designs and Trade Marks at the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, within one month of the date mentioned. The objections must be stated on Trade Marks Form No. 7, cost £2, obtainable through any money order office. The extracts—from 'The Trade Marks Journal'—given below are reproduced by permission of the Controller of H.M. Stationery Office.

OMNIPLAST (784,997) For rolls and sheets, all made principally of paper or of paperboard, or of combinations of paper or of paperboard with metallic foil and films of thermoplastics, and all included in Class 16. By Organisation Internationale du Thermo SAC S.C., 71 Forelstraat, Ghent, Belgium. Address for service is c/o Bromhead and Co., St. Paul's Chambers, 19-23 Ludgate Hill, London, E.C.4. To be associated with No. 784,998 (4223, 628). (Class 16; June 17 1959.)

VINYLON

(782,104) For coating compositions (in the nature of paint) made of vinyl plastics. By Jenson and Nicholson Group Ltd., 36 St. James's Street, London, S.W.1. To be associated with No. 353,851 (1849, 1390) and others. (Class 2; June 17 1959.)

OZABRADED (778,300) For all goods included in Class 16 made wholly or substantially wholly of plastics. By Ozalid Co. Ltd., 62 London Wall, London, E.C.2. To be associated with No. 448,237 (2416, 1608) and others. (Class 16; June 17 1959.)

OZABRADED (778,301) For all goods included in Class 16 made wholly or substantially wholly of plastics. By Ozalid Co. Ltd., 62 London Wall, London, E.C.2. To be associated with No. 448,237 (2416, 1608) and others. (Class 16; June 17 1959.)

FERROSIL (786,287) For silicon steel in the form of sheets and of strips, and laminations made therefrom. By Richard Thomas and Baldwins Ltd., 47 Park Street, London, W.1. (Class 6; August 12 1959.)

NYPHOS

(780,761) For printing plates made of nylon plastics. By A. H. Lakeman (Printing Machinery and Appliances) Ltd., Eyot Works, Eyot Gardens, Hammersmith, London, W.6. (Class 12; August 12 1959.)

NEW COMPANIES

Kittridge Flooring Ltd. (628,976)—May 28. Capital: £1,000 in £1 shares. The directors are: Stephen J. Kettridge, 30 Hall Lane, Upminster, Essex; and Charles W. Durrant, 222 Hatch Road, Brentwood, Essex. Regd. office: 97 Old Park Ridings, Winchmore Hill, London, N.21.

Dogana Products Ltd. (631,242).—June 26. Capital: £1,000 in £1 shares. To carry on the business of manufacturers of and dealers in plastics and plastic substances, etc. The directors are: Evelyn Inkley, 5 Cross Road, Thundersley, Essex, and Charles C. Stuart, chairman, 77 The Ridgeway, London, E.4. Regd. office: Selborne Works, Selborne Road, London, E.17.

Omnitubes Ltd. (631,358).—June 29. Capital: £1,000 in £1 shares. To buy, sell, manufacture, repair, convert, let on hire and deal in wire cable controls and rigid and flexible tubes of plastic extruded composite rubber of coated fabric or other material, etc. The directors are: John Moseley, director of Compoflex Co. Ltd., etc.; Gladys Walthoe, both of 56 Denbigh Street, London, S.W.1; Hugo Oling, 143 Norris Road, Sale, Cheshire, director of Kohorn Plastics and H. Oling Industrial Consultants Ltd. Regd. office: 56 Denbigh Street, London, S.W.1.

R. A. Wolstenholme Ltd. (631,182).—June 25. Capital: £1,000 in £1 shares. To carry on the business of manufacturers of and dealers in fancy goods, leather and rubber, alabaster, marble and other goods, etc. The directors are: Reginald A. Wolstenholme and Mrs Grace C. Wolstenholme, both of 20 Paul Street, Frome, Somerset. Regd. office: 20 Paul Street, Frome, Somerset.

Golborne Plastics Ltd. (631,246).—June 26. Capital: £5,000 in £1 shares. To carry on the business of manufacturers of and dealers in plastic substances and materials, etc. The directors are: Simon Moss and Rachael Moss, both of 79 Park Avenue North, London, N.W.10. Regd. office: 3 Oxford Street, London, W.1.

Maidenhead Flooring Co. Ltd. (631,334).—June 29. Capital: £1,000 in £1 shares. To carry on the business of flooring manufacturers, contractors and specialists, etc. The directors are: Arthur L. Edwards, The Cottage, School Lane, Maidenhead; Herbert J. Farr, Esbert, Bracken Road, Coxgreen, Maidenhead; Daphne M. Spencer. Regd. office: 4 York Road, Maidenhead.

Premier Plastics Ltd. (631,496).—June 30. Capital: £1,000 in £1 shares. To carry on the business of manufacturers of and dealers in plastics, etc. The directors are: Laurence R. Battell, 117 Hart Road, Thundersley; William J. Wildman, 64 Woodside Avenue, London, N.12. Regd. office: 90 Lower Thames Street, London, E.C.3.

Carshalton Chemicals Ltd. (631,522). June 30. Capital: £100 in £1 shares. To carry on the business of manufacturers of and wholesale and retail dealers in paints, varnish, synthetic resins, plastics, etc. The directors are: Neil R. MacCleaster and Mrs. Joyce M. MacCleaster, both of 89 Richmond Road, Beddington, Surrey; directors of Bleep Products Co. Ltd. Regd. office: 16b Hill Lane, Carshalton, Surrey.

Newman-Green Valve Co. Ltd. (631,590).—July 1. Capital: £50,000 in £1 shares (25,000 'A' and 25,000 'B'). To carry on the business of chemists, chemical engineers, designers, injection moulders, compression and vacuum moulding manufacturers, machinists, engineers, etc. The directors are: Lucas W. E. Mueller, 7 St. Mervyns Avenue, Point Piper, New South Wales, director of Parco (Chemicals) Pty. Ltd., appointed by 'A' shareholders; Thomas M. Ramsay, Struan Street, Toorak, Victoria, director of Kiwi Polish Co. Pty. Ltd., appointed by 'B' shareholders. Regd. office: 1 Brumwill Road, Hanger Lane, London, W.5.

Erica Automotive Products Ltd. (631,041).—June 24. Capital: £100 in £1 shares. To carry on the business of manufacturers of and dealers in tyres, etc. The directors are: Margaret A. Earwicker, 78 Norman Avenue, Sanderstead, and Margaret S. James, 4 Compton Court, Victoria Crescent, S.E.19. Regd. office: 78 Norman Avenue, Sanderstead.

Rayburn Plastics Ltd. (628,866).—May 26. Capital: £200 in £1 shares. To carry on the business of manufacturers, fabricators and distributors of plastic goods, etc. The directors are: Douglas P. Brundle, 852 Bristol Road South, Northfield, Birmingham 31; Mrs. Winifred M. Pettinger, 4 Cropthorne Road, Shirley, Solihull. Regd. office: New Road, Dudley, Worcs.

South London Vulcanizing Works Ltd. (628,820).—May 26. Capital: £1,000 in £1 shares. To carry on the business of manufacturers of and dealers in and repairers of rubber, balata and gutta percha, rubber tyres, tubes, etc. The directors are: Alfred W. T. Nobles, tyre dealer, and Charlotte E. Nobles, both of 17 Church Lane Drive, Hooley, Coulsdon. Regd. office: 7 John Ruskin Street, London, S.E.5.

PATENT LIST

Printed copies of the Specifications in the following list, published by permission of the Controller of H.M. Stationery Office, can be obtained from the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d., including postage, but about six weeks after the date of this publication will usually elapse before they come available. Orders with remittance may be sent in advance to the Patent Office, and will be fulfilled immediately the Specifications are published.

COMPLETE SPECIFICATIONS ACCEPTED

Open to public inspection on July 29 1959

Moser-Glaser and Co. A.G. Solid synthetic resin material and method of its manufacture. 817,362.

Swedlow Plastics Co. Process for preparing continuous plastic sheets. 817,343.

Imperial Chemical Industries Ltd., J. W. Batty, A. E. Henshall and H. Sagar. Process for preventing the accumulation of electrostatic charges on synthetic fibres composed of polyamides or of polythene terephathalate. 817,355.

Rohm and Hass Co. Stabilization of unsaturated linear polyesters. 817,554.

Ateliers de Constructions Electriques de Charleroi. Articles made of synthetic resinous material moulded with metallic inserts and method of manufacture thereof. 817,345.

Crown Machine and Tool Co. Plastic injection moulding-machines. 817,191.

Midland Silicones Ltd. Organosilicon compounds. 817,237.

General Tire and Rubber Co. Plastic-coated multiple-ply fabric. 817,309.

Owens-Corning Fiberglas Corporation. Treated flexible glass structures and methods for treating flexible glass structures to improve the bonding relation with resins. 817,464.

Owens-Corning Fiberglas Corporation. Flexible glass structures and methods for treating flexible glass structures to improve the bonding relation with resins. 817,465.

Open to public inspection on August 6 1959

Winterbottom Book Cloth Co. Ltd. Production of resin filled sheet-like material. 817,891.

Farbwerke Hoeschst Aktiengesell-

A container built by British Railways for Birds Eye Frozen Foods Ltd. is insulated with 4-in. 'Onazote' all round and has a 'Rubazote' door sealing gasket. 'Onazote' is a form of expanded ebonite, with a non-intercommunicating cell-structure. 'Rubazote' is a soft, expanded rubber in which the individual cells are sealed one against the other. They are both made by Expanded Rubber Co. Ltd. of Croydon

schaft Vorm. Meister, Lucius and Brüning. Method and apparatus for subdividing a tube or discontinuous container of thermoplastic material filled with liquid, flowable salve or fine powder, into separate packages. 817,645.

Bergwerksgesellschaft Hibernia A.G. Process for the polymerization of olefines. 817,632.

National Research Development Corporation. Polymeric substances. 817,684.

American Cyanamid Co. Resin compositions substantially stablized against crystallization. 817,741.

Farbenfabriken Bayer A.G. Filaments of acrylonitrile polymers. 817,614.

Bonner Kunststoff G.m.b.H. Flexible profiled plastic threads or strips suitable for the manufacture of sliding clasp fasteners and a method for their production. 817,715.

Firestone Tire and Rubber Co. Polymerization and copolymerization of butadiene. 817,693.

Firestone Tire and Rubber Co. Method for preparing synthetic rubbery polymer. 817,695.

Midland Silicones Ltd. Process for modifying polyols. 817,625.

Soc. Rhodiaceta. Filamentary materials formed of polyolefines and the production thereof. 817,626.

Union Carbide Corporation. Resinous mixtures. 817,587.

Sun Oil Co. Polymerization of olefins. 817,887.

Esso Research and Engineering Co. Method for preparing resin feed and resins formed therefrom. 817,857.

Firestone Tire and Rubber Co. Pneumatic tyre construction. 817,657.

Cimex Trust. Process and equipment for the production of parts from fibre-reinforced synthetic resins. 817,875.

Dow Chemical Co. Method and agent for making cellular vinyl aromatic polymers. 817,656.

Open to public inspection on August 12 1959

N. F. Barty. Synthetic resinous compositions and articles made therefrom. 818,301.

Dunlop Rubber Co. Ltd. Rubbery polymers and their preparation. 818,032.

De Bataafsche Petroleum Maatschappij N.V. Batchwise catalytic process for preparing alkylene polymers and catalysts therefor. 818,033.

Goodyear Tire and Rubber Co. Phenolic antioxidants for use in rubber. 818,035.

Houilleres du Bassin du Nord et du Pas de Calais. Method of producing composite articles of polythene and polyester and articles produced thereby. 818,036.

Koppers Co. Inc. Olefinically unsaturated compounds and polymeric compounds derived therefrom. 818,143.

Consortium Für Elektro-Chemische Industrie G.m.b.H. Process for the manufacture of polyvinyl alcohol of high purity. 818,294.

W. M. Tarrasch. Thermo-plastic containers. 817,994.

Farbenfabriken Bayer A.G. Process for the production of polyurethane foam. 818,359.

Farbwerke Hoechst Aktiengesellschaft Vorm. Meister, Lucius and Brüning. Manufacture of soluble polyvinyl alcohols. 818,037.

Farbenfabriken Bayer A.G. Production of hydroxy polythioethers. 818,360.

Schnakenberg and Co., Bleibear-Beitung G.m.b.H. Apparatus for the production of welded seams on thermoplastic synthetic materials. 818,066.

Hudson Foam Plastics Corporation. Manufacture of polyester materials. 818,213.

British Industrial Plastics Ltd. Unsaturated polyester compositions. 818,039.

Kalle and Co. A.G. Polyterephthalic acid ester based coated foils. 818,176.

General Electric Co. Method of preparing alkylpolysiloxanes. 818,305.

Farbenfabriken Bayer A.G. Process for the production of sheet-like structures from polymer emulsions. 818,041.

Whiffen and Sons Ltd. Expanded thermoplastic materials. 818,224.

Kodak Ltd. Linear polyesters and polyesteramides. 818,157.

S. Blanchi and R. Lacour. Continuous elements of reinforced plastic material and methods and machines for the production thereof. 818,149.

Rohm and Haas G.m.b.H. Modified polymers. 818,249.

Increases of Capital

Sterling Coated Materials Ltd. (393,007). Manufacturers of glass and plastic goods, etc., Sterling House, 8 Heddon Street, London, W.1.—Increased by £95,000 in £1 shares, beyond the registered capital of £5,000.

Changes of Name

Itshide Rubber Co. Ltd. (161,822), Sandringham Road, Petersfield, Hants. —Name changed to ITS Rubber Ltd. on February 13 1959.

R.J.I.P.

ANNUAL EXPORT NUMBER

will be published on OCTOBER 17 and, owing to increased size, will close for press earlier than usual. All Classified advertisements for this edition should reach this office not later than first post MONDAY OCTOBER 12.

Rubber Journal and International Plastics CLASSIFIED ADVERTISEMENTS

APPOINTMENTS VACANT

6d. a word, Minimum 10/- Box 2/-

LARGE manufacturers of all types of rubber and plastic flooring, centred in London, require a general manager of high-calibre with experience in similar fields to control sales and distribution of these products. A good salary commensurate with the applicant's experience and ability is available for the man with the correct qualifications who must have knowledge of both contract work and direct sales.—Apply in complete confidence to Box 222. (222)

SALES representative. For London and Home Counties. Experience and knowledge general rubber goods essential. Excellent prospects for young man with enthusiasm and energy. Post carries car, salary and expenses.—Application giving details of experience and current salary to Box 215. (215)

APPOINTMENTS VACANT

(continued)

RUBBER spreading. A supervisor is required by London rubber manufacturers. Applicants should be fully experienced in textile proofing and blanket spreading. This is a permanent staff appointment, superannuation facilities are available, and the salary will be commensurate with experience.—Apply giving full details to Box 220. (220)

SALES clerk. Required Croydon area. Must have experience general rubber goods, hose and belting to handle telephone orders, quotations. Real opportunity for young and energetic man. If suitable, promotion to outside sales staff or office management will follow.—Write giving details of age, experience and present salary to Box 214. (214)

APPOINTMENTS VACANT
(continued)

PLASTICS
North British Rubber and U.S. Rubber of America

are expanding their Plastics operations at Castle Mills, Edinburgh and offer opportunities in both Technological and Production fields. Technologist candidates should be graduates and of A.P.I. status, experienced in factory operations and conversant with plastics calendering, forming and extrusion.

Candidates for the Production appointment should have had experience of all aspects of production and quality control of plastics, and possess degree in Chemistry or Engineering. Initially the successful candidate will be attached to the Technical Organization to acquire basic knowledge of the products after which he will take up a Production appointment. These posts offer excellent prospects for advancement. Age preferably below 40. Salaries will be attractive and in line with the responsibility of the appointments.

Company benefits include a contributory superannuation scheme and free life assurance. Applications marked Plastics indicating which post is applied for should be addressed to Industrial Relations Division, The North British Rubber Co. Ltd., P.O. Box 47, Castle Mills, Edinburgh, 3. (219)

MILL room chargehand required for North-West London rubber factory. Must be fully experienced and used to the control of labour.—Apply in writing stating full particulars of past experience, etc., to Box 223. (223)

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GOOD-QUALITY natural rubber scrap wanted. Minimum 50 per cent. hydrocarbon content, all types of moulding scrap, including transfer scrap required, light colours—no black. Arisings regularly cleared at good prices.—Details to The Cannon Rubber Manufacturers Ltd., Ashley Road, Tottenham, N.17. (218)

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REPRESENTATIVE required by rubber and plastic foam manufacturers to cover East Midlands and Eastern Counties. General trade conducted with all classes of industry. Candidates should reside to the North or East of London. Salary and commission. Car provided if required.—Box 224. (224)

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Address Box Number replies to:
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Maclaren House, 131 Great Suffolk Street, London, S.E.1

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75	E.E.C.	735	S.C.	
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70	L.D.C.	1,460	S.C.	High torque
65	B.T.H.	730	S.C.	
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